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CONTENTS

	PAGE
I	School of Medicine and University Hospital 2
II	School of Dentistry 11
III	School of Law
IV	College of Arts and Sciences 14
	A. Department of Bacteriology 14
	B. Department of Chemistry 17
	C. Department of English 22
	D. Department of Foreign Language and Literature
	E. Department of History 25
	F. Department of Philosophy
	G. Department of Physics 27
	H. Department of Psychology 28
	I. Department of Sociology
	J. Department of Zoology 34
V	College of Business and Public Administration 38
	A. Bureau of Business and Economic Research 38
	B. Bureau of Governmental Research 39
	C. Department of Business Organization 39
	D. Department of Economics 40
	E. Department of Geography 42
	F. Department of Office Technique and Management
	G. Department of Government and Politics 45
VI	College of Education
VII	Glenn L. Martin College of Engineering and Aeronautical Sciences
	A. Institute for Fluid Dynamics and Applied Mathematics

Volume VI	May 15, 1953	Number 2
XIII	Financial Statements	94
XII	Graduate School	85 85
XI	Live Stock Sanitary Service	83
	M. Soil Conservation	74
	L. Rural Sociology	
	K. Poultry	73
	J. Horticulture	72
	I. Entomology	71
	H. Dairy	70
	G. Botany	69
	F. Animal Pathology	68
1952/53	E. Animal Husbandry	
02.00	2 D. Agronomy	65
UPUB	C. Agricultural Engineering	64
ARchi	B. Agricultural Education and Rural Life	64
play gland	A. Agricultural Economics and Marketing	63
X	Agricultural Experiment Station	63
11	College of Physical Education, Recreation and Health	60
IX	College of Physical Education Requestion and	59
VIII	F. Department of Mechanical Engineering	
	E. Department of Electrical Engineering	
	D. Department of Civil Engineering	
	C. Department of Chemical Engineering	
	B. Department of Aeronautical Engineering	
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Edited by Harvey L. Miller, Director of Publications, University of Maryland.

# RESEARCH

# IN THE

# UNIVERSITY OF MARYLAND

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THE primary purpose of this report is to present a broad and comprehensive picture of the research conducted at the University. The objectives of this report are twofold:

- 1. To meet the requirements of Chapter 14 of the Laws of Maryland which requires the University to submit an annual report to the General Assembly and further provides, "Such annual report shall clearly indicate, by donor and amount, and purpose, unless the purpose must be withheld for reasons of national security, all gifts, grants and dedicated funds that may have been received by or made available to the University during the period covered by the report." This report complies with the national security provision, and excludes all material relating to research in this area.
- 2. To inform the citizens of the State of the research conducted by the University, the accomplishments, and future areas of investigation to be probed.

The research reported in this study relates to the following categories of investigation:

- A. Research sponsored by specific contracts, private gifts, and grants. This work is carried on without cost to the citizens of Maryland.
- B. Research supported by the University through budgetary appropriations, including Federal funds.
- C. Research conducted by individual members of the faculty, which research may not be directly supported by grant or separately budgeted funds.

The financial schedule included in the back of this report enumerate by donor, amount, and purpose the details of the following funds expended for research:



The Main Administration Building University of Maryland College Park, Md.

Endowment Funds	\$ 51,523.76	
University Funds	198,927.00	
Restricted Contracts for Research:		
A. Educational Departments	562,945.43	
B. Live Stock Sanitary Service	43,359.75	
Agricultural Experiment Station:		
A. State Appropriations	434,700.95	
B. Federal Appropriations	198,433.74	
C. Special Funds	146,470.25	
D. Restricted Contracts for Research	103,070.89	
School of Medicine:		
Gifts and Grants	329,650.44	1
Total Disbursements for Research and Other Restricted Funds	\$2,069,082.21	

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Biological Chemistry Laboratory

# I. School of Medicine and University Hospital

# ANATOMY

# A Revision of the Anatomy of the Male and Female Pelvis

Membranous sheaths in the human pelvis have been discovered which play a very important role both in the understanding of the anatomy of the pelvic organs and in surgery. They contain important blood vessels and nerves, and also give support to the pelvic organs. The purpose of this investigation is to dissect these sheaths so that they can be described and illustrated.

#### Musculature of Bladder and Prostate

An exact knowledge of the pattern of the musculature of the bladder is necessary in order to understand fully the function of this organ both under normal and pathological conditions. A new concept of the bladder has been arrived at which indicates that the fiber bundles of the bladder musculature are of great length and extended throughout all the layers of the muscular part of the bladder wall. This arrangement is of such a nature that a single nerve impulse to each of these fiber bundles and the ensuing contraction are capable of effecting a contraction of the bladder in all its parts thereby effecting the expulsion of the urine. The investigation of the musculature of the prostate gland is important in understanding the development of tumors.

# The Difference Between Male and Female in the Length and Location of the Ureter

In surgical operations in the pelvis, it is often difficult to locate the ureter before it is inadvertently injured or cut. This investigation is designed to establish specific landmarks for location of the ureter, and in addition to study the differences between male and female with respect to the length of the ureter.

### The Finer Structure of the Mammalian Lung

In the unexpanded lungs of the unborn, the future air spaces are completely lined by a continuous layer of cells. With the expansion which occurs at birth, the finer structures undergo sudden alterations and readjustments in order to bring the blood capillaries into the closest possible contact with the air. At this time the lining of the air spaces ceases to exist as a continuous layer of cells. This has been interpreted by some as complete disruption of the cellular layer, and by others as a severe stretching of the lining membrane which makes it invisibly thin. Analysis of motion picture films indicates that the membrane becomes discontinuous permitting capillaries to come into immediate contact with the air in the spaces which are left between the cells of the original membranous lining. An intimate knowledge of the lung's finer structure places the treatment of pulmonary disease upon a more rational basis, and is of great importance to those who plan and carry out the treatment in cases of pulmonary tuberculosis, cancer, etc.

# A Study of the Influence of Certain Endocrine Factors on Immunological Mechanisms

This investigation demonstrated that the lethality of anaphylactic reactions could be suppressed by either cortisone or injections of large doses of porphyrin, and a light shock preceding the challenging dose of horse serum.

#### **ANESTHETICS**

# Study of Analgesic Drugs

The purpose of this study is to determine the mechanism of the relief of pain by various analgesic drugs, and to synthesize new analgesic drugs of superior quality to those generally used. Bromo-aspirin and bromo-phenacetin have been prepared and appear to be useful analgesic drugs.

# To Produce New and Bettre Drugs for Use in the Treatment of Hypertension

The synthesis and study of drugs that will be useful in the treatment of hypertension is in progress. Many new compounds of promise have been synthesized, and at present one of them is in clinical use.

### BACTERIOLOGY

# Study of Bacterial Cytology

This project is concerned with the cytology of the organism *Bacillus cereus* in both its spore and vegetative stage. It is concerned with the application of various techniques to germinating and vegetative forms of *Bacillus cereus*.

# A Study of the Mode of Action of Chloramphenicol

This investigation demonstrated that *Escherichia coli*, which is sensitive to chloramphenicol, can be "trained" to grow in 2 mg per ml of chloramphenicol. This highly resistant strain is unstable in the absence of chloramphenicol, and tends to quickly lose its resistance. The results demonstrate the growth of sensitive mutants even in the antibiotics presence. The sensitive mutants overgrow the resistant cells so that the population manifests the characteristics of the sensitive cells.

# A Study of the Metabolism of Amino Acids

The replacement of p-aminobenzoic acid as a growth factor for *Lactobacillus arabinosus* by d-lysine has been generally held. The findings of this investigation support the conclusion that the growth promoting activity is not due to d-lysine per se, but to p-aminobenzoic which contaminates the lysine samples.

#### BIOLOGICAL CHEMISTRY

# The Identification, Determination, and Physiological Significance of the Aromatic Acids in Human Urine in Health and Disease

This study is concerned with the development of more precise methods for the determination of urinary phenols, aromatic acids, and nitrogenous constituents. This should result in more accurate animal experimentation in this field, and provide a more scientific approach to the study of human diseases, especially the anemias, oligophrenia phenylpyruvica, vitamin and nutritional deficiency diseases.

# BLOOD ANALYSIS

# To Develop Improvements in the Analytical Procedures for Barbiturate Analysis

The purpose of this study is to develop an improved analytical method for the determination of "sleeping pills" in the blood. The procedure for analysis is being improved and the defects eliminated.

#### THE BRAIN

### Comparative Classification and Historic Notes on Brain Tumor

The purpose of this study was to expand and organize the names and the meanings which have been devised for the orderly arrangement of groups of maladies occurring within the brain, specifically those of cancerous type. It includes the details of the derivation and the synthesis of the various names which European and American contributors have used in their researches with regard to this particular category of human illness.

# A Roentgen Technique for Demonstrating Radio-Opaque Deposits in Brain Tissue Slices

The purpose of this investigation was to develop and perfect a method for taking x-ray pictures of thin slices of brain tissue. The research resulted in the perfection of a technique for x-ray production of films showing the distribution of lime salts. It is possible that different types of deposits that can be detected by x-ray will show different types of x-ray pictures which might enable the doctor to render a more accurate diagnosis.

# Encephalomalacia in Children Suffering from Tuberculous Meningits

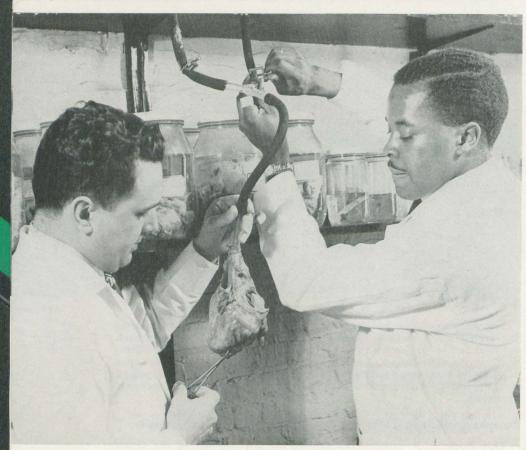
This research is designed to explore certain diseases of the brain and the coverings of the brain, specifically the inflammatory disease or infection produced by the T.B. germ. The postmortem specimens of approximately 200 children and adults were carefully and completely examined. The results of this study will further the understanding of certain weaknesses and abnormal movements exhibited by children who are suffering from T.B. disease of the brain or its covering.

# The Pathology of Cerebral Phlebothrombosis

The purpose of this investigation is to study a series of human specimens who have suffered from stoppage of veins in the brain or in the large blood channels or in the large veins leading from the brain back to the heart. A compilation of the principal causes of this malady has been made including suggestions for the control of the stoppage of the veins in the brain, and for studies on the possible results of this malady if the patient survives.

# The Cytology of the Cerebrospinal Fluid with Relationship to Intracranial Neoplasm

The appearance of cells in the fluid which surround the brain and spinal cord in instances where brain tumor or cancer is present was investigated.



Dr. Russell S. Fisher and John H. Thompson studying the nature of the lesions in the arteries of the heart

# Microbiological Study of Cryptococcus Neoforms

Torulosis is a disease caused by an organism that infects the brain, and there is no cure for this condition. During the past two years 400 new drugs have been studied to determine their effect upon this organism. About 10 of these drugs appear promising as they kill the bug or keep it from growing in culture media. At present the relation between chemical structure and physiological activity in relation to this organism is being studied.

# The Nature of the Pathological Changes in the Brain After Mechanical and Chemical Injuries

The purpose of this study is to determine the minute details of the pathology of injury to the central nervous system due to mechanical and chemical agents. At present the studies are proceeding in the field of mechanical injury, but shortly investigations in the field of chemical warfare will commence.

#### CANCER

# To Differentiate by Radioactivity Between Effusions Associated With Benign Malignant Processes

Preliminary results indicate that there are significant differences in the P-32 activities of pleural effusions resulting from malignant and non-malignant lesions. If additional observations confirm the present data, it is contemplated that in properly selected cases this test will have distinct diagnostic value in differentiating some benign and malignant pleural effusions.

# To Evaluate Precancerous and Cancer-like Conditions in the Female Generative Tract

The occurrence of changes that simulate cancer or precancerous state in the lower end of the human womb is under study. It has been demonstrated that pregnancy produces unusual changes in the lining of the cervix and these changes are readily confused with precancerous changes.

#### Cancer Detection

The purpose of this investigation is to develop the use of exfoliative cytology in the detection of cancer in the lower bowel. If the results prove positive, once cancer is suspected it could be detected in a very brief time and with marked accuracy.

### To Discover and Transplant Melanomas in Axolotls

The purpose of this research was to develop an axolotl colony (larval salamanders) for the purpose of studying the development of black tumors in these animals. These tumors are transplantable and the material offers an excellent medium for the study of the basic aspects of the melanoma problem.

# To Compare the Nitrogen Metabolism of Normal and Cancerous Mice

Analytical methods are being developed for the determination of diamines and polyamines in the tissue of mice. When this phase of the project is completed the utilization of these compounds by normal and cancerous tissues will be studied.

# To Investigate the Influence of Various Types of Stress and Hormonal Imbalances on Cancer Incidence

This investigation is concerned with the development of a strain of mice susceptible to leukemà, and for work involving the influence of stress on cancer. In this study evidence was obtained showing that stress of various kinds seems to accelerate the processes of cancer production by certain injected chemicals.

## To Discover a Method of Improving Radiation Treatment of Cancer

Several years ago it was discovered that a blood pigment derivative (hematoporphyrin) would accumulate in cancer tissue when injected

into animals tumors. Evidence from animal experiments and treatment of cancer patients indicates that the presence of these pigments in the cancer makes the cancer more sensitive to x-radiation and perhaps other types of ionizing radiations from radioactive materials. A very important outgrowth of this work was the discovery that one of the commonly employed materials used for sleeping pills or general anesthetic for surgery would protect animals against the effects of radiation. This discovery holds great promise of developing a practical way to protect large populations against the impact of atomic weapons.

# Maintenance of a Mouse Colony for Cancer Research

Over the past few years a strain of fat mice has been developed. Thirty generations of inbreeding has resulted in excellent material for the study of such problems as the influence of obesity on cancer incidence, diabetes, and cardiovascular diseases.

#### GYNECOLOGY

# Ovarian Status by Urinary Estrogen Determinations Following Pelvic Irradiation

Urinary estrogen assays were done by bioassay with spayed mice, and data was obtained concerning the course of the decrease of estrogen output following radium treatment to the cervix.

# Reorganization of Oncological Therapy as Applied to Gynecology

This study involves the introduction of a new system of therapy for carcinoma of the cervix.

#### THE HEART

# Study of Vasodilator Drugs and the Coronary Arteries

This is an investigation of the mechanism of action of vasodilating drugs in dilating coronary arteries and the increase of blood to the heart in angina pectoris and coronary disease.

# The Nature of the Heart Disease Causing Sudden Death

This is a study of the nature of lesions in the arteries of the heart in cases of sudden death. It is designed to furnish additional information as to the pathological nature of this disease with the hope that we will learn something of value from the preventive standpoint, as well as establishing more accurate criteria for interpreting the causes of death.

# The Study of the Influence of Obesity on Heart and Vascular Diseases

This is an investigation of the incidence of heart and vascular disorders in the fat and thin mice of the same strain. Of special interest is the tendency of these fat mice to develop arteriosclerosis of the heart vessel, as well as vessels in the brain and other regions of the body. The relation of diet in these fat and thin mice to the tendencies to develop arteriosclerosis is under study.

#### METABOLISM

# A Study of the Purine Metabolism of Micrococcus Pyogenes

A strain of *Micrococcus pyogenes*, var. aureus, resistant to 2 mg per ml. of chloroamphenicol possesses a double purine requirement. Adenine and guanine were isolated from the cells and analyzed quantitatively and qualitatively for radioactivity. The results indicate no interconversion of either purine base. A comparative study is in progress in an attempt to determine the metabolic block and its possible relation to the mode of action of chloramphenicol.

### The Changes in Rat Anterior Pituitory Tissue

This investigation is designed to study metabolic changes in individual rat anterior pituitaries induced by *in vivo* and *in vitro* treatment with various synthetic and natural hormones. The most important metabolic change to be studied is oxygen consumption.

#### NUTRITION

# Effects of Antibiotics and Sulfa Drugs on Nutritional Requirements and the Utilization of Food

A number of experiments are in progress varying the diets of growing rats to determine the effectiveness of 3-nitro-4-hydroxyphenylarsonic acid, arsenical, and arsonic acid on growth and feed efficiency.

# The Function of Putrescine and Related Compounds in the Metabolism of Microbiol and Animal Tissue

Various investigations on growth factors led to the discovery of putrescine, spermine, and spermidine as essential vitamins for *Hemophilus parainfluenzae* #7901. This discovery was the first demonstration of an essential metabolic function for these compounds. Putrescine and the related amines are new growth factors which are important because of their application to human nutrition and the prevention of disease.

#### **OBSTETRICS**

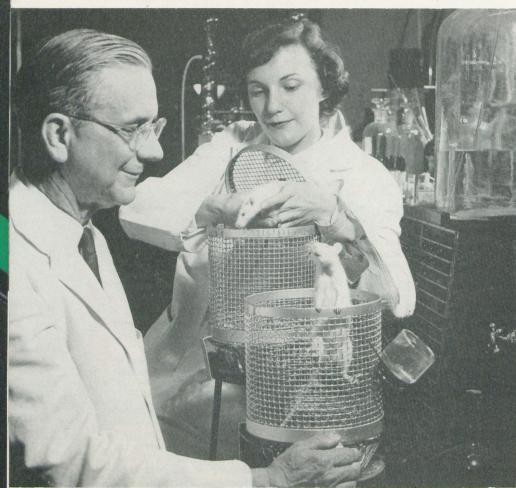
# To Study the Relationships of X-ray Pelvimetry to All Pertinent Obstetrical Complications

This is a long-term study of the relationship of the normal and contracted pelves to normal labor, uterine inertia, fetal weight, and fetal head size. The value of x-ray pelvimetry has been demonstrated in these investigations.

#### PEDIATRICS

#### Use of Antibiotics in Bacterial Diseases

The clinical effect of erythromycin in bacterial diseases of children is under study.



Dr. E. G. Schmidt and Mrs. Jean Gardenier studying the effects of the addition of antibiotics to the diets of growing rats

# Regurgitation in Infants

The causes of regurgitation due to psychogenic, dietary, organic, and functional factors are being investigated. The effects of food and food substances on gastric motility and hydrogen-ion concentration are being studied through in-vivo electrode and balloon methods.

# Study Cystic Fibrosis of the Pancreas

This investigation is designed to develop more convenient and accurate methods to analyze duodenal drainage in infants and children.

# The Causes of Unexpected Death in Infancy

This pathologic study of the causes of sudden and unexpected death in infancy commenced in 1951 and is essentially complete. Over one hun-

dred cases of infant deaths have been studied from the standpoint of virology, bacteriology, and toxicology. The results indicate that these sudden deaths are largely due to infection and that mechanical suffocation in the bedclothes is relatively insignificant. These findings are significant in that they signify the importance of early recognition of the presence of infection as a means of prevention of death in infancy. In addition, this information will help remove the stigma of neglect usually suffered by mothers of children in which the diagnosis is incorrectly made.

### The Relation Between Interstitial Pneumonia and Bronchopneumonia

This is an investigation of the details of the pathological changes in the lungs of infants dying of overwhelming infection. A microscopic study of the entirety of both lungs from cases of fatal overwhelming infection is in progress.

### The Absorption of Boric Acid Through the Intact Skin

This investigation was initiated because of several infant deaths in which it was considered that boric acid had penetrated through the skin in sufficient quantities to produce fatal levels. The study has shown that boric acid does pass through the intact and irritated animal skin, and that the rate of absorption is increased by irritation. However, there is little danger of poisoning of infants from adsorption through the skin unless very strong boric acid powders are applied to very large areas of irritated skin.

#### PHYSIOLOGY

# Effects of Acute Decompression Stress Upon Plasma Potassium

In an attempt to explain the fall in plasma potassium, anesthetized nephrectomized dogs were subjected to comparable degrees of decompression.

# Analysis of Muscle Proteins

By new methods of extraction, muscle protein solutions have been prepared and analyzed by electrophoresis and ultracentrifugation. As a result a new fibrous muscle protein, called D-protein, has been discovered. Studies are in progress to discover the physiological meaning of D-protein in the contraction relaxation cycle.

#### IRRADIATION

The Effect of Large Doses of Whole Body X-Ray on the Survival of Monkeys in the Presence of Other Noxious Influences

Experiments gaging the effect of irradiations on monkeys and the survival value of chloromycetin, Neomycein-Sulfathaladine, and Monkey Amoebiasis are in progress.

### ADDITIONAL PROJECTS: RESEARCH IN PROGRESS

#### Department of Dermatology

- 1. Monoliasis Complicating Antibiotic Therapy—conducted by H. M. Robinson, Jr.
  - 2. Scleroderma—conducted by H. M. Robinson, Sr.
- 3. Treatment of Chronic Leg Ulcers—conducted by H. M. Robinson, Sr.
- 4. Evaluation of Erythromycin in the Treatment of All Dermatoses—conducted by H. M. Robinson, Jr., M. M. Cohen, I. Zeligman, and A. Shapiro.
- 5. Evaluation of the Local Use of Cortisone—conducted by H. M. Robinson, Jr.
- 6. Evaluation of Magnamycin in the Treatment of Dermatoses—conducted by H. M. Robinson, Jr., M. M. Cohen, A. Shapiro and I. Zeligman.
- 7. Treatment of Granuloma Inguinale—conducted by H. M. Robinson, Jr. and M. M. Cohen.

# Department of Neurological Surgery

- 1. Experimental Ligations of Major Cerebral Vessels and Effects on Blood Pressure—conducted by James G. Arnold.
- 2. Preliminary Hypophysectomy and Its Relation to Blood Pressure—conducted by James G. Arnold.
- 3. Experimental Evaluation of Contrast Media for Myelography—conducted by James G. Arnold.

# Department of Surgery

- 1. Balloon studies of motility in patients with megacolon—conducted by E. R. Shipley.
  - 2. Salivary pH and buffering capacity—conducted by E. R. Shipley.
- 3. Intestinal antibacterial agents, with Dr. Yeager—conducted by E. R. Shipley.
- 4. Clinical evaluation of emetrol on postoperative nausea—conducted by E. R. Shipley.
- 5. Gastric pH and motility in cooperation with the Departments of Pediatrics and Physiology (Dental)—conducted by E. R. Shipley.
- 6. Clinical evaluation of various new drugs and dressings—conducted by George H. Yeager.
- 7. Studies on the anatomy of the thoracic sympathetic system—conducted by George H. Yeager.
- 8. Continuation of intestinal flora study with newer antibacterial agents—conducted by George H. Yeager.
- 9. Left side mechanical heart—conducted by George H. Yeager.
- 10. Total adrenalectomy in hypertension—conducted by George H. Yeager.
- 11. Clinical evaluation of Injection Bicillin L-A—conducted by George H. Yeager.
- 12. Evaluation of Cortone therapy in vascular disease—conducted by George H. Yeager.

- 13. Continuation of studies on the use of fibrosing agents in the treatment of aneurysms, etc.—conducted by George H. Yeager.
- 14. Experimental production and treatment of aortic regurgitation—conducted by George H. Yeager.
- 15. Study of Furacin Solution as a preservative for venous grafts—conducted by George H. Yeager.
- 16. Evaluation of various types of artificial prosthesis in blood vessel grafts—conducted by George H. Yeager.
- 17. Evaluation of blood vessel graft storing—conducted by George H. Yeager.
- 18. Institution of a cardio-pulmonary physiology laboratory—conducted by George H. Yeager.
- 19. Extraction of alkaline phosphatase from bone—conducted by George H. Yeager.
- 20. Histological effect of sympathectomy on tracheal bronchial tree—conducted by George H. Yeager.
- 21. Effects of vagal stimulation on the normal heart—conducted by George H. Yeager.

### **PUBLICATIONS**

# Papers in Progress

### Department of Anatomy

Frank, H. J. Figge and George C. Peck. "Effect of Hematoporphyrin on the Hypophysis."

George C. Peck, H. Patterson Mack, and Frank H. J. Figge. "Influence of Hematoporphyrin, ACTH, and Cortisone on the Survival of Sensitized Mice Injected with Shocking Doses of Horse Serum."

Ralph Wichterman and Frank H. J. Figge. "Lethality of X-rays in Paramecium and the Effect of Hematoporphyrin and Other Substances Upon X-ray Sensitivity."

# Department of Biological Chemistry

- R. E. Vanderlinde, "The Inactivation of Stilbestrol in Alkali."
- E. G. Schmidt, "A Laboratory Manual of Biological Chemistry."
- E. G. Schmidt, "The Effect of Ether Extracts of Urine on the Growth of Rats."
- G. Kessler, Vanderlinde, R. E., and Schmidt, E. G., "The Effect of 3-Nitro-4-hydroxyphenylarsonic Acid on the Growth of Rats."
- E. J. Herbst, "Studies with Analogues of Growth Factors for Hemophilus parainfluenzae."
- E. J. Herbst, "An Investigation of the Metabolism of Hemophilus parainfluenzae."

# Department of Pathology

- John A. Wagner, "Classification of Brain Tumor; A Comparative Historical and Evolutionary Study." In preparation.
- John A. Wagner, "Cerebral Phlebothrombosis." In preparation.

John A. Wagner, "Encephalomalacia in Infants Suffering from Tuberculous Leptomeningitis." In preparation.

John A. Wagner, "Intracerebral Teratoma in the Newborn Resulting in Dystocia." In preparation.

John A. Wagner, "The Cytology of Cerebrospinal Fluid in Relation to Glioma." In preparation.

John A. Wagner, "Congenital Intracranial Aneurism and Ischemic Necrosis of the Hypophysis; A Report of Two Cases." In preparation.

#### PAPERS PUBLISHED, ACCEPTED OR SUBMITTED FOR PUBLICATION

#### Department of Anatomy

- 1. Robert Hingson and Frank H. J. Figge. "A Survey of the Development of the Jet Injector in Parenteral Therapy." Anesthesia & Analgesia Journal, Vol. 31; 1952.
- 2. H. Patterson Mack and Frank H. J. Figge. "Sodium Pentobarbital Anesthesia and Mortality from X-radiation in C<sub>57</sub> (Black) mice." Science, 115: 547-548, 1952.
- 3. V. V. Brunst, E. A. Sheremetieva-Brunst, and Frank H. J. Figge. "Influence of Local X-ray Treatment on Development of Jaws in Young Axolotl." (Siredon mexicanum.) *Proc. Soc. Exp. Biol. and Med.*, 1952, 79:401-403.
- 4. Frank H. J. Figge and Ralph Wichterman. "The Effects of Hematoporphyrin and Other Substances Upon X-ray Sensitivity of Paramecium." *Biol. Bull.*, Vol. 103, No. 2, 1952.
- 5. Ralph Wichterman and Frank H. J. Figge. "Environmental factors concerned with the lethality of x-rays in Paramecium." *Biol. Bull.*, Vol. 103, 311, 1952.
- 6. V. V. Brunst, E. A. Sheremetieva-Brunst, and Frank H. J. Figge. "The Effect of Local X-ray Irradiation Upon the Teeth and Surrounding Tissues in Young Axolotis (Siredon mexicanum)." J. Dental Res., Vol. 31, No. 5, Oct., 1952.
- 7. George C. Peck, H. Patterson Mack, and Frank H. J. Figge. "A Study of the Effect of Hematoporphyrin on Hypophyseal-Adrenal Relationships." *Proc. Soc. Exp. Biol. and Med.*, Vol. 83:264-266, 1953.
- 8. V. V. Brunst and Frank H. J. Figge. "Age sensitivity of the spinal cord of the mouse to local x-ray irradiation." *Anat. Rec.*, V. 112, No. 2, February, 1953.
- 9. V. V. Brunst, E. A. Sheremetieva-Brunst, and Frank H. J. Figge. "A Comparison of the Reactions of the Limbs of 2 Day Old Mice and Urodele Amphibian to Roentgen Irradiation." Am. J. Roentgenology and Rad. Therapy, Vol. LXX, No. 2, August 1953.
- 10. V. V. Brunst and Frank H. J. Figge. "The Influence of Roentgen Rays Upon the Development of the Mouse by Local Irradiation of Some Parts of the Body." J. Lab. & Clin. Medicine, 41:534-542, 1953.
- 11. V. V. Brunst and Frank H. J. Figge. "The Influence of X-ray Irradiation of A Narrow Band Between the Fore and Hind Limbs of Mice of Various Ages Upon Their Subsequent Growth and Development." Anat. Rec., 115:290 Feb., 1953.
- 12. Frank H. J. Figge and George C. Peck. "Cancer Detection and Therapy. Affinity of Lympathic Tissues for Hematoporphyrin." *Anat. Rec.*, 115:306, Feb., 1953.

- 13. Frank H. J. Figge and Ralph Wichterman. "The Influence of Hematoporphyrin, sodium nitrite, and nembutal on radiation sensitivity in Paramecium." *Proc. Soc. Am. Ass. Cancer Res.*, Vol. 1, No. 1, April, 1953.
- 14. Vernon E. Krahl. "Observations on the newborn mouse lung during initial expansion of the alveoli." Anat. Rec., 112:51-52.
- 15. Vernon E. Krahl. "The expansion of pulmonary alveoli in the newborn mouse." Anat. Rec., 115:448, 1953.
- 16. E. A. Sheremetieva-Brunst. "An Epithelioma in the Axolotl." *Proc. Am. Ass. Cancer Res.*, Vol. 1, No. 1, April, 1953.
- 17. Geraldine F. Wolfe and Frank H. J. Figge. "Influence of hormonal imbalances resulting from gonadectomy, parabiosis, seasonal variation, and stressors on latent period of methylcholanthrene-induced tumors in mice." *Proc. Soc. Am. Ass. Cancer Res.*, Vol. 1, No. 1, April, 1953.
- 18. Harry M. Robinson, Jr., Frank H. J. Figge, and Eugene S. Bereston. "Fluorescence of Microsporum Audouini-Infected Hair. I. Chemical and Spectroscopic Studies." A.M.A. Archives of Dermatology & Suphilology, Vol. 68:129-135, August, 1953.
- 19. V. V. Brunst and R. J. Clayton. "Photographing Small Laboratory Animals." Laboratory Investigation, Vol. 2:376-387, No. 5, 1953.
- 20. Uhlenhuth, Eduard; DeWitt T. Hunter and William E. Loechel. "Problems in the Anatomy of the Pelvis." J. B. Lippincott Co., Philadelphia, Pa., 1953.

### Papers Accepted for Publication

- 21. V. V. Brunst and Frank H. J. Figge. "Roentgen paralysis in the mouse." Am. J. Roentgenology and Rad. Therapy.
- 22. V. V. Brunst and Frank H. J. Figge. "A comparison of the effects of local roentgen irradiation on jaw and tooth development in the young axolotls and mice." Am. J. Roentgenology & Rad. Therapy.
- 23. Hunter, DeWitt T. "A New Concept of Bladder Musculature." J. Urology (in press).
- 24. Vernon E. Krahl. "The expansion of pulmonary alveoli in the newborn." Virginia Medical Journal (in press).

# Papers Submitted for Publication

- 25. George C. Peck and Frank H. J. Figge. "Cancer Detection and Therapy. III. Affinity of Lymphatic Tissues for Hematoporphyrin." Bull. of Univ. of Md. School of Medicine.
- 26. V. V. Brunst and Frank H. J. Figge. "The Effect of Local Irradiation Upon the Development of the Anterior Part of the Head of the Axolotl." J. of Morphology.

# Department of Bacteriology

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- 2. "Loss of Chloramphenicol Resistance in E. coli," Herrmann, E. C., Jr., and Steers, E., J. Bact., In press.
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#### UNIVERSITY HOSPITAL

The Clinical Effectiveness of Furadatin in the Treatment of Urinary Tract Infections Studied.

Research is in progress to determine the effectiveness of furadantin in the treatment of pyelitis of pregnancy.

#### **Publications**

Hemiballismus: "Hemichorea Following a Lesion of the Corpus Luysi," James A. Arnold. The Journal of Nervous & Mental Disease, Vol. 116, No. 1, July 1952.

"Treatment of Post-Pneumoencephalographic Headache With B-Pyridyl Carbinol Tartrate (Roniacol Tartrate)," James A. Arnold. The American Journal of the Medical Sciences, Jan. 1953.

"Xanthochromia of the Cerebrospinal Fluid; Preliminary Description of Several New Colored Substances," James A. Arnold. A.M.A. Archives of Neurology and Psychiatry, June 1953.



The University's Schools of Dentistry and Pharmacy, Baltimore, Md.

# II. School of Dentistry

#### DENTAL CARIES

#### Incidence of Dental Caries in Baltimore

The purpose of this study is to determine the incidence of caries in Baltimore prior to the time of the much disputed fluoridation of the water supply. Subsequent investigations following the period of time when benefits could be gained from the presence of fluoride will be made in order to complete the study.

#### DENTAL MATERIALS

#### Plastic Moulages

The purpose of this investigation is to test various plastic materials to produce accurate anatomical models for use in basic science courses.

#### Pigments for Wax Moulages

Chemically testing of pigments for permanency and the effects upon color of natural and artificial resins and gums for coloring wax models is in progress. Results to date indicate that artificial microcrystalline waxes retain the original hues, values and tones better than natural waxes.

# Oligodynamic Action of Dental Materials

Investigations are continuing to determine the antibacterial action of dental filling materials in bacterial culture media in the presence and the absence of serum and saliva. In this study the test organisms are being isolated from the mouth.

#### DENTAL PROCEDURES

# Color Photography

Problems concerning the stabilization and control of light sources, filters, processing and colors to achieve uniform and lasting results in all phases of still and motion picture photography are being studied.

# Invino pH Determinations in Carious Lesions

By using an antimony electrode pH readings are being recorded. The readings are again noted after rinsing the mouth with fermentable and non-fermentable materials. These results are being compared statistically to determine if there are significant changes.

### Cellulose Degradation

In reducing the resistence of *Mycobacterium phlei* to antibiotic agents the synergistic activity of a cellulose decomposing organism against the Mycobacterium is being employed.

### Oxygen Uptake of Sensitized and Non-Sensitized Organisms

The oxygen uptake of Salmonella typhosa in the presence of specific homologous antiserum has previously been found to be approximately double that of the same bacteria in a non-immune or non-sensitized system. If this phenomenon can be elicited in physiologically different groups of bacteria then a possible explanation of immune reactions can be proposed on this basis. At present the enteric group of organisms are under study.

### Metallic and Plastic Implants for Aid in Denture Construction

Studies are in progress to determine the tissue tolerance and mechanical design of the newer plastics as compared with metal implants in the jaws. These implants will be used as an aid in the construction of full dentures.

### The Effect of Childhood Habits on Facial Development and Occlusion

A study of childhood habits and their effect on facial development and dental occlusion is continuing. The correlation between the type of habit and the amount of time employed and manner of employing the habit was taken into consideration. The findings indicate that depending upon the previously mentioned factors, there is usually some aberration in facial development and deviation in dental occlusion.

#### DEVELOPMENT OF DENTISTRY

# Dentistry and the Dentist in Literature

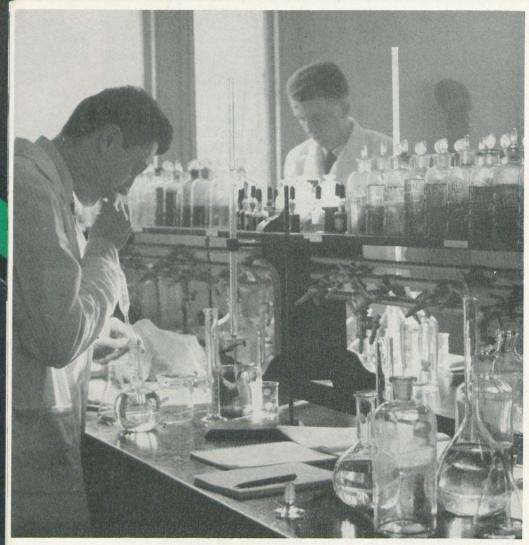
The School of Dentistry possesses the world's most extensive collection on the subject of dentistry literature. All types of literature are represented: namely, novels, plays, poems, diaries, letters, biographies, and many other. The material reflects the history of dentistry from ancient times to the present, and particularly expresses the lay concepts of dental practice in various countries over the centuries.

# Biographical Information on the Alumni of the School Gathered

The data collected thus far make the alumni records of the School of Dentistry the most complete file of graduates possessed by any dental school in the country. A detailed examination is in progress of all the proceedings and publications of dental journals published in this country since 1839.

# Effects of Hyaluronidase on Drug Absorption

Hyaluronidase, the "spreading factor" of Duran-Reynals, has been suggested as an adjuvant in local anesthetic solutions. The object of this research is to determine its efficacy in the hands of a novice in overcoming the barrier of successful conduction anesthesia-anatomical variation.



Dental Laboratory

#### DRUGS

#### L-Cobefrin as a Vasoconstrictor

The purposes of these investigations are to measure the potency and toxicity of L-Cobefrin in the field of local anesthesia. Results to date indicate that this drug is safe for clinical use, has a vasoconstrictor potency of about one-third that of epinephrine, and is stable in an acid environment (pH 4-5) for a minimum of six months.

# The Effect of Cholchicine on the Mitotic Rate in the Developing Rat Tooth

The histological determination of the effects of the alkaloid drug, colchine, on the developing incisors of young albino rats is under study. The purpose is to establish a mitotic index in control animals and the turnover rate of cells forming the dentinal structures ascertained.

### Chromatographic Determination of Protein Fractions

A higher incidence of arterosclerosis occurs in the normal male than in the normal female. However, this difference is not observed after the menopause suggesting that sex hormones are involved. The effect of various active and inactive estrogens on the serum lipoprotein pattern of rabbits is being studied with the aim of elucidating their effects and determining their therapeutic value in the treatment of arteriosclerosis.

#### ORAL SURGERY

### Healing Following Tooth Extraction in Monkeys

The dynamics of the healing of tooth sockets has been studied in rats and dogs, but not in man. Studies with monkeys are in progress, since they are closest to man, to determine a practical concept of healing which may be used by the oral surgeon.

#### **TUMORS**

### Histopathology of Cranio-Pharyngeoma

Research is in progress to ascertain whether cranio-pharyngeomas differentiate into the same types as ameloblastomas and thereby to determine the origin and behavior of these tumors.

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"Some Antiseptics and Germicides Used in Dentistry." Donald E. Shay. Proceedings of the Pennsylvania Academy of Sciences, Vol. 27, 1953.

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"Objectives in Pre-clinical Teaching of Crown and Bridge Prosthesis." Ernest B. Nuttall, D.D.S. J. D. Educ. Vol. 15; pp. 11-14; disc. 14-17, November 1950.

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# III. School of Law

### Legal Aid Clinic

This Clinic is operated in conjunction with the Baltimore Legal Aid Bureau. Selected senior students, under faculty supervision, work in the Clinic carrying on research in connection with the problems of clients of the Legal Aid Bureau.

#### **PUBLICATIONS**

"Uniform Rules of Criminal Procedure with Comments," Roger Howell, 1952 Handbook of the National Conference of Commissioners on Uniform State Laws.

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#### SCHOOL OF MEDICINE

(University of Maryland, Baltimore)
The oldest in the United States from
which classes have been graduated
continuously since the building's
erection in 1812.

# IV. College of Arts and Sciences

# A. DEPARTMENT OF BACTERIOLOGY

#### ANTIBIOTICS

#### Anti-Antibiotics from Bovine Rumen Bacteria

Feeding antibiotics such as penicillin to chicks and pigs has resulted in great increases in their growth rate, but calves have not responded. It is believed that this may be due to factors elaborated by bacteria which destroys various antibiotics. This may be a very valuable discovery because anti-antibiotics would have great practical use in medicine and in various other nutritional problems both animal and human.

#### BACTERIOLOGICAL WARFARE

The Study of Bacteria Which Can Be Used as Stimulants in Bacteriological Warfare

A study of bacteria which can be used as simulants in bacteriological-warfare is now in progress.

#### CELLULOSE

# A Study of the Synthesis of Cellulose by Acetobacter Xylinum

The purpose of this research is to study various phenomena attending the synthesis of cellulose by *Acetobacter xylinum* and to identify some of the intermediate products in order to elucidate the possible pathway by which the synthesis is accomplished.

#### DENTAL CARIES AND ORAL BACTERIA

# To Study Enzymatic and Bacteriological Mechanism of the Mouth

This work is a continuation of last years studies on dental caries. X-radiation of the head of dogs had little effect upon the two enzymes studied, lysozyme and hyoluronidase. No increase in caries was noted nor was there evidence of jaw necrosis. No bacterial multiplication was noted in the oral cavities of these animals. Apparently humans react differently to X-radiation, and further studies are indicated relative to the bacterial flora of the internal structure of the tooth.

# Investigation of the Action of Oral Bacteria on the Organic Matrix of Human Teeth

The investigation of the effect of oral bacteria on the organic constituents of human enamel and dentin has been undertaken with the aim of characterizing the role played by these materials in the pathogenesis of dental caries. It has been found that the removal of the inorganic portion of dentin allows some microorganisms to hydrolyze this protein, whereas they are ineffective in attacking the intact material (combined organic and inorganic material). Investigations are in progress to determine what effect the removal of inorganic material has on the availability of the protein matrix to oral bacteria.

#### DISEASES

# Preliminary Report on Serological Relationship Between Strains of VIBRIO FETUS

This research was undertaken in an effort to establish a good diagnostic test for *Vibrio fetus*, an infection of livestock, especially cattle. The study indicated that a strain of *Vibrio fetus* to be selected as an antigen should be agglutinated to a fairly high titer by all antiserums. The purpose of this study is to develop a good serological test.

# Studies of the Influence of Divalent Cation Upon the Standardization of the Complement-Fixation Reaction

This study was undertaken to improve complement-fixation tests for diagnosis of syphilis. The results indicate that the effect of Mg\* and Ca\* must be considered in standardization of the complement-fixation test. When optimal concentrations of these divalent cations were considered, an increase in sensitivity of the test was apparent. This investigation makes it possible to discover weakly positive syphilitic serums.

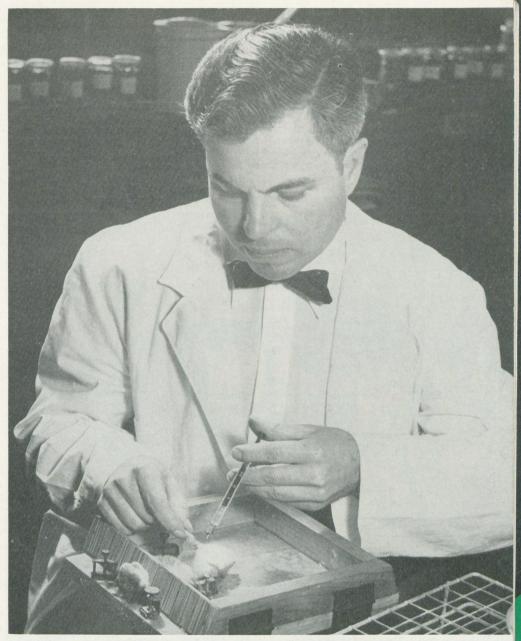
# Bacteriological Examination of the Middle Ear of White Rats

Experiments relative to middle ear infections (labyrinthitis) of the white rats are in progress.

#### DISINFECTANTS

# Development of Media for Disinfectant Testing

The phenol coefficient technique is a bacteriological procedure for evaluating the effectiveness of disinfectants. Some variations in results are occasionally encountered and this is believed to be due to variations in composition of the medium. Some of the media thus far developed show promise, but the problem is to devise a medium that is more susceptible to standardization.



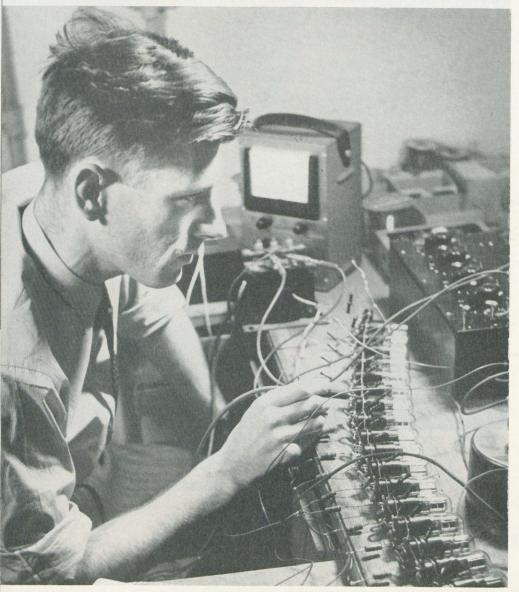
Lt. Colonel Hubert D. Palmer (U.S.A.F.) removing the serum from a hamster that will be used to study tooth decay

#### **ENZYMES**

# To Discover Means of Degrading Lignin by Microorganisms

This study is being conducted to discover means of degrading lignin by microorganisms or enzyme preparations. Lignin is one of the major waste products of the paper industry, and the potential contribution of this work is immeasurable. One enzyme isolated from the experiment fungi has been found to effect a plant growth substance, and this may be associated with its pathogenesis.

# Testing a multiplication circuit to be used in gauging turbulence



#### FOODS

# Examination of Intestinal Flora of White Rats to Determine the Possible Changes When Tri-Glyceride (TEM) is Included in a Standard Diet

Tri-glyceride is frequently used as an ingredient in bread, ice cream, and other food products. The pupose of this investigation is to determine whether this ingredient effects the bacterial flora of human beings. The results indicate that no harmful effect will result from the utilization of TEM in food products.

#### JOHNE'S BACILLUS

# Preparation of Culture Media for the Primary Isolation of Johne's Bacillus

These investigations indicate that the primary isolation of *Mycobacterium paratuberculosis* can be facilitated by 1) digesting the original inoculum with oxalic acid, sodium hydroxide and sodium triphosphate, and by 2) addition to the culture medium of dyes and antibiotics which may inhibit contaminating organisms.

#### **POLYSACCHARIDES**

# Polysaccharide Synthesis by Bacteria

A bacteria that grew on conidendrin (a product obtained from wood in the processing of paper) produced a polysaccharide substance. This material (polysaccharide) was isolated and characterized. Currently bacterial polysaccharides are of practical interest as substitutes for blood plasma in transfusions.

#### RESPIRATORY METABOLISM

# Physiological Studies of Mycobacterium Paratuberculosis

A study of the respiratory metabolism of *Mycobacterium paratuber*culosis and compounds active in inhibition of the oxygen uptake is under way.

#### **PUBLICATIONS**

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### B. DEPARTMENT OF CHEMISTRY

#### ACIDS

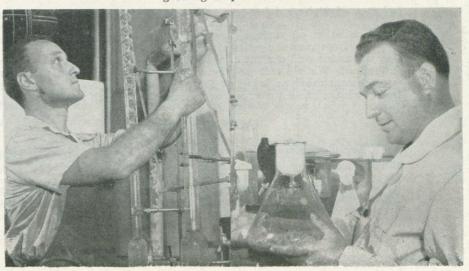
# The Kinetics of Cyanohydrin Formation in Non-Aqueous Media

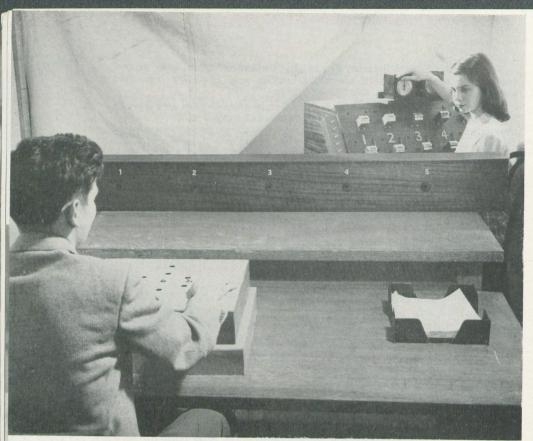
This study is concerned with the speed with which propionaldehyde reacts with hydrogen cyanide in methyl alcohol and in butyl alcohol under controlled conditions.

### Correlation of the Fading of the Chromium-Diphenylcarbazide

Qualitative tests using phosphone sulfuric, and acetic acids in varying concentrations have been made. No quantitative measurements have yet been carried out.

The College of Arts and Sciences working with the Navy. Dr. Sidney Gottlieb, left, performing analysis on lignin. Dr. Michael J. Pelczar, right, examining cultures of molds growing on powdered wood





Using the five lights test to determine the effects of prolonged performance in causing fatigue

#### ALGAE

# Isolation of Biological Important Phosphorus Compounds from Algae

The isolation of various phosphorous compounds of biological importance from various species of algae has been accomplished. In addition the amino acid content of the protein fractions of these algae was determined. While a number of phosphorus compounds and amino acids were demonstrated as being present, the quantities and difficulties of isolation make algae a poor source economically for such materials.

### ALKALOID SALTS

# An X-Ray Crystallographic Investigation of Yohimbine Hydrochloride and Bromide

Unit cell dimension and angles of the two alkaloid salts have been determined. Refractive indices of the two salts and the density of the hydrochloride have also been determined.

#### **ANALGESICS**

# Synthesis for a Group of Compounds Considered as Phenpropylamines and Phenethyl

An investigation of the syntheses of a group of compounds considered as phenethyl and phenpropylamines was undertaken to determine the possibility of an analgesic biological activity. Some of the substances prepared have shown very encouraging results.

# Synthesis of a Group of Chemical Substances Designated as "Spiro-Cyclohexylindaneamines"

It was believed that these substances would exhibit the biological phenomena of analgesia or pain-deadening action. Such was found to be the case, but, unfortunately all the substances had very undesirable biological side-effects.

#### ANALYTICAL CHEMISTRY

# Synthesis of Alpha-Alkoxy Acids

This investigation has as its objective the preparation of a series of compounds related to alpha-methoxyphenylacetic acid. These will be examined to determine their usefulness in analytical chemistry as precipitants for sodium, and will be supplied to the U. S. Department of Agriculture investigators for evaluation of plant hormones.

# ASCORBIC ACID (VITAMIN C)

# Metal Catalyzed Oxidation of Ascorbic Acid

This study of the metal catalyzed oxidation of ascorbic acid is designed to determine the role of ascorbic acid in cellular oxidation.

### BENZENE CHEMISTRY

# "Open Chain Analogues" of Certain Aromatic Compounds

A number of "open chain analogues" of certain aromatic compounds have been prepared, and the chemistry and physical properties of these are being studied to further our understanding of certain aspects of benezine chemistry.

### CATALYSTS

# Study of Certain Hydrogenation Reactions

Hydrogen gas can be made to react with a variety of organic compounds by shaking the compounds in an atmosphere of hydrogen with a suitable catalyst. This study is concerned with a comparison of two catalysts, cobalt and nickel, to determine which is the better catalyst in the hydrogenation of oxines to amines.

#### COORDINATION COMPOUNDS

### "Exchange" Reactions of Chromium Complex Compounds

Experiments in "exchange" reactions of chromium complex compounds are in progress, i.e., the replacement of an ion coordinated to chromium by the same ion existing in solution as such. The only direct way of detecting and measuring such an exchange is to use a radioactive tagged ion and to follow the increase of radioactivity in the complex compound, or the decrease of radioactivity of the ionic solution. Further work on this problem will involve application of the techniques of ion exchange and chromatography to isolate and identify reaction products.

#### DISTILLATION

#### Reaction Rates of Distillation

The reactions being studied are: a) the condensation of anilines with benzoins and with benzaldehydes; and b) the oxidation of alcohols and ketones with selenium dioxide. The major objectives are to determine the effects of variation in structure of the reaction, to develop improved methods of synthesizing useful chemical compounds, and to elucidate the theory of the particular chemical reaction.

#### DRUGS

# The Condensation of Quinones with Active Methylene Compounds

The primary objective is to establish the structure of the chemical compounds formed by the interaction of quinones and the active methylene compounds such as diethyl malonate. The chemical compounds formed are of potential pharmaceutical value but the major emphasis is in their fundamental chemistry.

# To Determine the Structure of Podophyllotoxin

A study was made of the infrared spectrum of podophyllotoxin and of related substances with a view to establishing the structure of the compound. The work has been brought to a successful conclusion, and the structure arrived at by infrared analysis agrees with the results of chemical investigation. Podophyllotoxin is of interest because of its possible curative characteristics for cancer.

# Synthesis of Compounds Related to Podophyllotoxin

The purpose of this research is to synthesize related compounds having the desirable tumor-damaging properties of podophyllotoxin but lacking its toxic properties. It is also hoped that podophyllotoxin itself will be synthesized since this compound has always been obtained from natural sources, and that finally its structure will be established.

#### **FLUORENE**

# An Investigation of the Crystal and Molecular Structure of Fluorene

Crystals of the compound fluorene have been studied by X-ray methods. Analysis of the data has shown that previous conclusions as to the structure of this molecule from X-ray data were incorrect and that the actual structure is the planar one indicated by other results of other methods of investigation.

#### **FLUORIDE**

#### A Method for the Fluorometric Determination of Fluoride

Several compounds have been investigated to determine an accurate and fast method for estimating small quantities of fluoride. The Zirconium-Flavonol complex shows some promise.

#### **FOOD STORAGE**

### Investigation of Changes in Crab Meat During Frozen Storage

Experiments are in progress to establish a relation, if any, between the respiration of frozen stored crab meat and the changes in flavor, texture, and odor.

#### **FOSSILS**

### Partial Analysis of a Fossil Porpoise Bone

Determinations were made of the percent of calcium, phosphorus, iron, magnesium, carbon, and silica in a fossil porpoise bone. It is believed that this was the first analysis ever made.

#### INSECT REPELLANCY

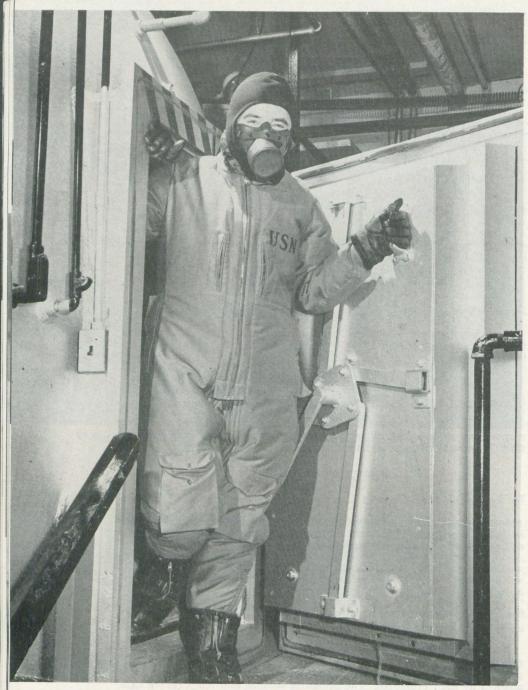
# To Synthesize Pure Organic Compounds for Insect-Repellent Studies

A number of compounds were synthesized to determine their qualities as insect repellants. The most effective procedures in the preparation and purification of each compound were developed.

#### MATTER UNDER HIGH PRESSURE

To Establish a Center for Experimental and Theoretical Research in the Study of the Behavior of Liquids, Solids, and Gases Under Pressures up to 5000 Atmospheres

A theoretical investigation of molecular interactions in highly compressed gases was begun, the objective being to gain insight into the properties of the molecule and the extent to which these properties are affected by high pressures. The pressure, volume, and temperature data and the thermodynamic properties computed from them are basic to all mechanical and chemical industries working with gases, liquids, or solids under high pressure.



Testing a thermal respirator at -50° F.

#### MOLECULAR SPECTROSCOPY

# To Construct a Recording Raman Spectrometer

The construction of a recording Raman spectrometer has been initiated. This instrument will be used in the broad study of band intensities being carried out by the molecular spectroscopy group and as an analytical tool for other research.

# Investigation of the Intensities of Infrared Bands and Raman Bands Related to Functional Groups

The first phase of the project, is an analysis of the infrared bands arising from hydrogen vibrations within molecules. This work is well underway and an investigation of acids is nearing completion. A theoretical result is a new correlation between absorption intensities and molecular structure, and a practical application may be an unusually sensitive method of analysis for acids.

#### ORES

# The Development of a New Colorimetric Reagent for the Determination of Zirconium

Zirconium is an important constituent of many ores, and the new reagent will simplify its method of determination.

#### ORGANIC CHEMISTRY

# Study of the Reaction of Organic Halides with Nucleophilic Reagents

The purpose of this study is to provide information relative to the mechanism by which nucleophilic displacement reactions occur.

#### RADIOCHEMICAL INSTRUMENTATION

# Design and Construction of Scalers

The objective of this work is the design and construction of scalers having exceptional stability and reliability over long periods of either intermittent or continuous operation. Of long range interest is the use of such a scaler as a basis of a completely automatic recording counter.

#### SOIL CHEMISTRY

### Tolerance of Earthworms to Arsenic

Many orchards have soil contaminated with arsenical spray residues. This study indicates that earthworms cannot live in soils which contain more than 300 parts per million of arsenic. This information is valuable because earthworms are important in soil fertility.

Detection of Minor Elements Such as Molybdenum, Vanadium, and Titanium

In determining the fertility of Maryland soils vanadium and titanium were detected, but molybdenum was not found. Molybdenum is essential for plant growth and perhaps it should be added to fertilizers.

#### SYNTHETICS

### Synthetic High Polymers

The long-range objectives of this research program is to determine the correlation of structure and properties in high polymers (rubber, fibers, and plastics) so that new materials with unusual properties can be designed. The results of these experiments are of use to investigators searching for an arctic rubber, a high temperature resistant plastic, oil resistant rubber, and a heat resistant fiber.

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Infrared Absorption Intensities of Functional Groups. I. By Robert A. Spurr, Carl R. Brainard, and James A. Stewart. Submitted to the *Journal of Chemical Physics*.

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#### In Progress

"X-ray Crystallography of Yohimbine Hydrochloride and Hydrobromide," George M. Brown.

"Analysis of Fossil Porpoise Bone," by Jack Marriott and R. C. Wiley. Reaction Rates by Distillation. VI. The Kinetics of the Etherification of Phenylcarbisols. E. F. Pratt and R. L. Erickson.

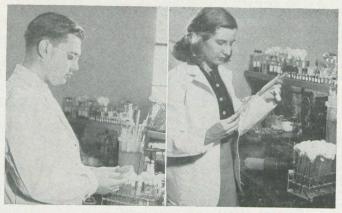
Reaction Rates by Distillation. VII. The Effect of Changes in Structure on Alkylations of Aromatic Compounds by Phenylcarbinols. E. F. Pratt and H. J. F. Segrave.

Disproportionative Condensations. II. A Synthesis of Benzylacetophenones. E. F. Pratt and A. P. Evans.

Reactions of Naphthoquinones with Malonic Ester and its Analogs. III. Reactions with Cyanoacetic Ester and Acetylacetone. E. F. Pratt, R. W. Luckenbaugh and R. W. Storberr.

Inhibition of Enzymes and Enzyme Systems by Analgesics. F. P. Veitch, Fred White and Robert McComb.

The Enzymatic Hydrolysis of Nitrogen Dioxide Oxidized Cellulose. F. P. Veitch and C. Feazel.



Reading the Results of Bacteriological Analyses of Water

Evaluating the Bacteriological Potency of Disinfectants

Spectroscopy Applied to Chemistry. Robert A. Spurr. A textbook on the uses in chemistry of infrared and Raman spectroscopy.

Articles submitted for publication:

"Substituted 3, 3-Dimethyl-1-aminoindanes", Woods, F. G., and Goo-On.

Articles in preparation:

a. The Synthesis of Some Phenethyl and Phenbutylamines," G. F. Woods, Gasser, Grenell and Rowe.

b. The Preparation of Certain Phenpropylamines and Some 2, -Phenyl-2-Methylpyrollidines," G. F. Woods, Bolgiano and Goo-on.

c. The "Open Chain Analogues" of Toluene and the Reduction of 2, 4-Heptadienal with Lithium Aluminum Hydride, F. G. Woods, Fleischhacker and Bolgiano.

# C. DEPARTMENT OF ENGLISH

#### AMERICAN CULTURE

# The American Lyceum: Town Meeting of the Mind

Before the Civil War the lyceum system of lectures was one of the most important means of adult education. This study is a pioneering attempt in describing the important 19th century American institution "in the round" from the point of view of history, literature, and sociology.

# American Culture in the Mid-19th Century

This investigation will be a comprehensive study of the American peoples taste in literature and fine art. Its potential significance lies in the picture it can give us of the cultural side of American civilization.

#### ANTHOLOGY

# American Poetry for the Use of Foreign Students

The purpose of this study is to afford foreign students a valuable and useful introduction to our American heritage and its affiliation with European, Latin-American, and Asian cultures.

#### BIOGRAPHY

#### The Life of Thomas Paine

This investigation is concerned with a critical and historical biography of Thomas Paine based upon new information gathered primarily from European archives (particularly French), English and American newspapers.

# The Early Political and Literary Career of Thomas Dunn English

This study covers English's life from his birth in Philadelphia in 1819 to his removal to western Virginia in 1852. It contains a detailed analysis of English's political activity in behalf of John Tyler and James K. Polk, as well as detailed treatment of his literary achievements, and his relations with numerous other men of letters.

# Cotton Mather, the First Significant Figure in American Medicine

The purpose of this study is to present Mather as the earliest figure of importance in American medicine, and to indicate his place in the general history of preventative medicine.

# The Central Concept and Its Symbols in Walter Van Tilburg Clark

This is the first, full-length study of the ideas of the authors of *The Ox-Bow Incident* and is close to a complete study of his symbolic patterns.

### COMPARATIVE LITERATURE

# Benjamin Franklin and the Men of Letters

This investigation is concerned with the influence of Franklin on French thought and will reveal the relations between eighteenth century America and France.

### INTERNATIONAL COPYRIGHT

# The American Struggle for International Copyright, 1866-1891

The significance of this research is that it clarifies certain misconceptions of the nature of the struggle for international copyright. The question of international copyright remains unsettled; as recently as 1952 an attempt at correction was made by introducing a bill in Congress (H.R. 4059, 82d Congress, 2d Session), and the matter is also under consideration by UNESCO.

#### LITERARY CRITICISM

### A Study of Dickens' Imagery

This investigation is concerned with a consideration of Dickens' use of figurative language: the types of images most frequently used in the novels as a whole, the purposes which they serve, and the figurative scheme for each novel according to its individual theme.

#### ROMANTICISM

### Journeys to Wonderland

This is the study of the appearance in English and American literature (1850-1950), whether for children or adults, of stories of mortals who journey to wonderlands. Authors considered include Lewis Carroll, William Butler Yeats, Walter de la Mare, George Macdonald, Arthur Machen, Pamela Travers, and many others. The investigation should throw considerable light on certain phases of romanticism, including the science-fiction of recent decades.

#### Work in Progress

An Annotated Edition of the Personal Letters of Robert E. Lee, by Francis R. Adams.

Benjamin Franklin and French Men of Letters, by A. O. Aldridge.

The Life of Thomas Paine, by A. O. Aldridge.

A Photofacsimile Edition of Charles Gildon's New Rehearsal (1714) for the Augustan Reprint Society, by G. F. Anderson.

A Finding List of Unpublished Doctoral Dissertations on Oriental Literature and East-West Literary Relations, by G. F. Anderson and John D. Yohannan.

A Re-Examination of Benjamin Franklin's Memoirs, by Jack C. Barnes.

A Study of Cotton Mather's Unpublished Manuscript, "Tri-Paradisùs," by O. T. Beall.

A Biography of Cotton Mather, by O. T. Beall.

An Anthology of World Folktales, by Franklin D. Cooley and George Anderson.

American Poetry for the Use of Foreign Students, by Hanford Henderson.

An Anthology of Nineteenth Century English Poetry, by E. A. Mooney, Jr.

A Collection of Essays on the Subject of Victorian Lyric Poetry, by Harold Orel.

A Collation of the Text of Coventry Patmore's Poetry and a Critical Review of Patmore's Accomplishments in Verse, by Robert M. Pierson.

The Appearance in English and American Literature (1850-1950) of Stories of Mortals Who Journey to Wonderlands, by Robert M. Pierson.

John O'Hara Up to Now, by John Portz.

The Central Concept and Its Symbols in Walter Van Tilbury Clark, by John Portz.

Clark's Use of Dreams and Dream Technique, by John Portz.

The Construction of Clark's, *The Track of the Cat*, by John Portz. John Marston: A Critical Study, by Gerald A. Smith.

Romantic Hellenism in England, 1800-1825, by Gayle S. Smith.

Critical Edition of William Kempe's The Education of Children in Learning, by Martha C. Stone.

#### **Publications**

Eighteenth-Century English Poetry, A. O. Aldridge. An anthology to be published by Harper & Co.

Benjamin Franklin and the Pennsylvania Gazette, A. O. Aldridge. A monograph (150 pages) to be published by the American Philosophical Society.

"Thomas Paine and the New York Public Advertiser," A. O. Aldridge. An article to be published in the October, 1953, issue of the New York Historical Association Quarterly.

"Benjamin Franklin and the Principles of Currency Exchange," A. O. Aldridge. An article to be published in the *Proceedings of the American Philosophical Society*.

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"The Study of Oriental Literature in American Universities," G. L. Anderson. To appear in the 1954 Yearbook of Comparative Literature.

"Cathay and the Way Thither: Oriental Literature in World Literature Program," G. L. Anderson, submitted to Modern Language Journal.

"Charles Gildon's Total Academy," G. L. Anderson, submitted to the Journal of the History of Ideas.

"Gildon vs. Prior," G. L. Anderson, submitted to  $Modern\ Language\ Notes.$ 

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Of Theodor Gaster's The Oldest Stories in the World (New York, 1952). G. L. Anderson. Forthcoming in Western Folklore.

Of Donald Keene's Japanese Literature: an Introduction (London, 1953). G. L. Anderson. For Books Abroad. In progress.

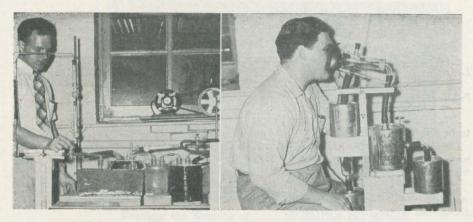
Of K. Guru Dutt, Existentialism: A Survey of Ancient Indian Thought. G. L. Anderson. (Basavangudi, Bangalore, 1953) for Books Abroad. In progress.

"A Method of Conducting the Technical Writing Course," Warren Benganson, accepted by College Composition and Communication.

Colton Mather, the First Significant Figure in American Medicine, O. T. Beall and Richard Shryock, to be published by Johns Hopkins Press.

"The Career of Aristotle's Master Piece in America," O. T. Beall. To be published shortly.

"The First American Philosophical Society," O. T. Beall. To be published shortly.



Measuring the metabolism of a mouse. The animal, contained in a flask, is at a pressure which represents an altitude of about 18,000 feet.

An experiment in human respiration. Heat loss due to evaporation of water in the lungs and warming of the breath is being measured.

The Sacred Seasons, Carl Bode, published by Alan Swallow, Denver, 1953.

Articles:

"Thoreau and his Last Publishers," Carl Bode. New England Quarterly (September 1953), XXVI, (383-7).

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Dawson and Wilson, The Shape of Sunday: an Intimate Biography of Lloyd C. Douglas, Carl Bode. Saturday Review (January 10, 1953), p. 14.

Fidler, Augusta Evans Wilson: a Biography, American Literature (January, 1953), Carl Bode. XXV, 566-7.

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"The Dynasts and Paradise Lost," Harold Orel. The South Atlantic Quarterly, Vol. LII, June, 1953.

"Shakespeare's Use of Plato's Superman," Gerald A. Smith. Article forthcoming in *Modern Language Notes*.

"The Selected Letters of William Cowper." Edited by Mark Van Doren, Gerald A. Smith, *Poetry*. LXXX (August, 1952), 279-301.

Introduction to a Scholars' Facsimile edition of William Kempe's *The Education of Children in Learning* (1588), Martha C. Stone. Ready for publication December, 1953.

"Christian Metaphor and Symbolism in the First Shakespearean Tetrology," Martha C. Stone. An article in preparation.

# D. DEPARTMENT OF FOREIGN LANGUAGE AND LITERATURE

### The German Americans, Immigration and Integration

This investigation is a survey of the beginning of the immigration history of the German element in the United States. It concerns the cultural and social contributions of the German-Americans, and the most eminent men in their history.

### A History of the German Stage

This study describes approximately twenty theatrical performances from the Middle Ages to the 20th century showing the development of this phase of German literature.

### The World of Baltasar Gracián (1601-1658)

This is a study of the parallels between the visual imagery of the *Criticon* by the Spanish writer Baltasar Gracián and the images in the objects of art which comprised the visual milieu in which Gracián lived and wrote.

# The King in the Plays of Lope de Vega

The purpose of this study is to elucidate the role of the king in Lope's plays with reference to medieval and rennaissance notions of the "Perfect Prince," considering him as governor, philosopher, judge, lover, and as dramatic element; his divine right and his duties and obligations.

# An Examination of the Role of Love in the Works of Roger Martin du Gard

The purpose of this study is to probe the methods and techniques of a reticent contemporary French author who has but recently begun to attain the respect he deserves in the field of French literature, in spite of the fact that he received the Nobel Prize for Literature in 1937.

# Work in Progress

"The Critical Spirit in the Letters of Madame de Sevigné," by Philip E. Arsenvault.

Man and His Circumstances in the Works of Gabriel Miró, by Alfred W. Becker.

Repertory of the Real Persons Mentioned in Balzac's Human Comedy, by F. A. Bridgers.

The Writings of the Forty-Eighters, by Eithel W. Dobert.

Le Messafe désespéré de Roger Martin du Gard, by William F. Falls.

A Biography of the Spanish Poet, Juan Ramon Jimenez, by Gracielo Nemes.

Book—Life and Works of Guez de Balzac (1597-1654), by W. R. Quynn. Part of book—Articles on Guez de Balzac, Chapelain, Vaugelas and Voiture in the seventeenth century volume of A Critical Bibliography of French Literature. W. R. Quynn. This may be published in 1954.

Articles finished, but some checking on detail to be done:

"Five Unpublished Letters of Guez de Balzac," W. R. Quynn.

"The Genesis and Publication of Balzac's Prince," W. R. Quynn.

Articles partially written:

"The Education of the French Classic Writers." W. R. Quynn.

"Nature in the Works of the French Classic Writers." W. R. Quynn.

"Handwriting in Seventeenth Century France." W. R. Quynn.

"Unpublished Letters of Betsy Patterson and Teresa de Guiccioli." W. R. Quynn.

Castile in the Works of Azorín, by Marguerite C. Rand.

The Correspondence of Morris R. Cohen, by Leonora C. Rosenfield.

The King in the Plays of Lope de Vega, by Philip Rovner.

"The Greek Stage," by Mark Schweizer.

"Rilke's Epitaph," by Mark Schweizer.

"Goethe's Influence on Keller," by Mark Schweizer.

#### **Publications**

"The Spanish work MATIZ: its Origin and Evolution in the Technical Vocabulary of Mediaeval Painters and Illuminators," Eleanor Bulatkin. To appear in *Traditio*, Vol. X, 1954.

"NUANCE: the Word the Thing and the Idea," Eleanor Bulatkin. Being submitted to Modern Language Notes or The Journal of Aesthetics and Art Criticism.

"The Italian Word SFUMATURA," Eleanor Bulatkin. To be submitted to Italia.

"The German Americans Immigration and Integration," Dieter Cunz. In Twenty-eighth Report of the Society for the History of the Germans in Maryland (1953).

"John Gruber and his Almanac," Dieter Cunz. Maryland Historical Magazine, Vol. XLII (1952).

"Bibliography Americana Germanica," Dieter Cunz. American German Review, Vol. IXX (1953).

Lone-Star Land, Frank Goodwyn. To be published by Alfred A. Knopf, New York.

"Another Mexican version of the 'Bear's Son' Folktale," Frank Goodwyn. Journal of American Folklore, Vol. 64, No. 260 (April-June, 1953).

"The Horsemen of the Americas: Los Jinetes de las Americas," Frank Goodwyn. Forthcoming this fall in *Inter-American Review of Bibliography*.

"A Note on the So-Called Clevage in Les Thibault of Roger Martin du Gard," Thomas W. Hall. To appear in the French Review.

"History of the Cynthia Moth in the U. S." A. C. Parsons. An illustrated article concerning the unsuccessful attempt to start a silk industry in the U. S. with the Oriental Cynthia or Ailanthus moth. Completed—not published.

"Weed or Medicinal Plant?" A. C. Parsons. An illustrated article concerning superstitions, folk-lore, and actual medicinal value of "weeds" familiar to most of us.

"The White-faced Hornet." A. C. Parsons. An illustrated article concerning activity within a hornet's nest. Accepted by *Nature Magazine*, but not yet published.

"To find Wild Honey." A. C. Parsons. Article published in Natural History Magazine, May, 1949, reprinted in anthology for remedial reading in Public Schools.

"How to Use French Libraries." W. R. Quynn. In January 1953 number of the Bulletin of the Institute of International Education.

"An Unpublished Letter of Voltaire." W. R. Quynn. To appear in the last number of 1953 of *Modern Language Notes*.

"Azorín, Prose Poet and Painter," Marguerite C. Rand. Books Abroad, Spring, 1953.

"El Licenciado Vidriera, Created by Cervantes, Re-created by Azorín." Marguerite C. Rand. Accepted by *Hispania*, February, 1954.

Book review of "Eloasis de los Clásicos," by Azorín. Marguerite C. Rand. Accepted for publication by Books Abroad.

"The Viennese Theatre," A. E. Zucker. American-German Review, October, 1952.

# E. DEPARTMENT OF HISTORY AMERICAN CIVILIZATION

The members of the department of history are preparing a college level text book in the history of American Civilization. The purpose of the book is to integrate the material so that the student can master an understanding of American History rather than memorize countless facts which have little or no meaning.

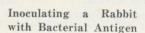
# DEMOCRATIC PARTY

# The History of the Democratic Party in the 1920's

Dissension and internal conflict along with a struggle for leadership so shook the Democratic Party that there were doubts that it would ever recover leadership. The process by which the Democrats, along with the older Progressives, adjusted themselves to changing intellectual, social, and economic conditions in this decade is the theme of this study.

# Bourbon Democracy of the Middle West, 1865-1896

This is a study of the dominant influences within the Democratic Party in the three decades after the Civil War. The conclusions indicate that leaders in the Middle West allied with the eastern leaders to retain control of the economic and financial policies of the nation so that they could acquire the profits from its rapid industrialization.





Recording Results on the Comparison of New Media for Enumerating Bacteria in Milk

### FINANCIAL HISTORY

# Financial History of the U. S. Government During 1775-1793

This study is concerned with the financial history of the government during the period of formation and includes such problems as public finance, paper currency, the allocation of revenue between the states and Congress, and social conflict between the rival groups involved.

# Currency Finance: An Interpretation of Colonial Monetary Practices

This study is a new interpretation of the quarrel that developed with Britian over the efforts of Parliament to suppress the paper money in the colonies in the period before the Revolution. It indicates that paper money experiments were often successful and supplied a valuable and successful means of exchange and did not always result in currency depreciation.

#### PEARL HARBOR

# The Pearl Harbor Story

This investigation is an analysis of the origins of the war in the Pacific with special emphasis on the Japanese attack on Pearl Harbor.

#### TEAPOT DOME

# Biography of the Late Senator Thomas J. Walsh of Montana

This biography, of one of the key Teapot Dome investigators will contain the first full length account of this notorious transaction which brought so much scandal to the Harding administration. In addition Senator Walsh's career as one of the leading Progressives of his era will be appraised.

### Work in Progress

Biography of the late Senator Thomas J. Walsh of Montana, by James L. Bates.

Financial History of the United States 1775-1793, by E. James Ferguson.

The Development of Australian Nationalism, by Donald Gordon. History of the Democratic Party in the 1920's, by R. Justus Hanks. Biography of the late Senator George W. Norris, by Richard Lowitt.

#### Publications

Bibliographical Guide to the Study of History. Richard H. Bauer. A revision, to be published by the McKinley Publishing Company, Philadelphia.

"Josephus Daniels and the Naval Oil Reserves, 1913-1948." James L. Bates. Naval Institute Proceedings, February, 1953.

"Currency Finance: An Interpretation of Colonial Monetary Practices." E. James Ferguson. *The William and Mary Quarterly*, April, 1953.

Biography of William E. Dodge (1805-1883). Richard Lowitt. To be published by Columbia University Press, New York.

The Pearl Harbor Story. Gordon W. Prange. To be published by McGraw-Hill Publishers, New York.

"American Business and the Approach of the War, 1935-1941." Roland N. Stromberg. *Journal of Economic History*, Winter, 1953.

Religious Liberalism in Early Eighteenth Century England. Roland N. Stromberg. To be published by Oxford University Press.

Bourbon Democracy of the Middle West, 1865-1896. Horace S. Merrill. Louisiana State University Press, 1953.

# F. DEPARTMENT OF PHILOSOPHY

Lucius Garvin, A Modern Introduction to Ethics. 572 pp. Published by Houghton Mifflin Co., January, 1953. A text, introducing the student to theoretical and practical issues in contemporary ethics.

Lucius Garvin, "Ducasse's Carus Lectures", published in *Philosophy and Phenomenological Research*, September, 1952, pp. 57-69. A critical discussion of some of the views set forth by C. J. Ducasse in his *Nature*, *Mind*, and *Death*.

Lucius Garvin, A Modern Introduction to Philosophy. Text book in preparation.

John Robinson. A long range program of research has been undertaken into conflicting contemporary views as to the proper functions of art, science, religion, and philosophy. The purpose of this inquiry is to enable the educator to produce men able, in an age of increasing specialization, to view the human enterprise as a whole. During the summer of 1953 a beginning was made at this task with an inquiry into the nature and function of art; it will be continued in the summer of 1954 with a similar inquiry into the nature and function of religion.

### Reviews Prepared

Lucius Garvin, The Theory of Universals, by R. I. Aaron. To be published in Philosophy and Phenomenological Research.

Lucius Garvin, Art and Technics, by Lewis Mumford. To be published in Philosophical Review.

Lucius Garvin, Faith and Moral Authority, by Ben Kimpel. To be published in The U. S. Quarterly Book Review.

John Robinson, Essay on Method, by C. Hillis Kaiser. To be published in the Philosophical Review.

John Robinson, Science and Value, by John Irving. To be published in the Philosophical Review.

# G. DEPARTMENT OF PHYSICS

#### COSMIC RAYS

# Study of Rapid Cosmic Ray Variations and Solar Effects

The purpose of this research is to gain additional evidence regarding the origin of cosmic radiation. In particular, rapid fluctuations of the cosmic radiation will be measured and correlated with solar phenomena.

#### GASEOUS ELECTRONICS

#### Research in Gaseous Electronics

These experiments are concerned with the improvement of Halogenfilled Geiger Counters. The measurements of small changes in chlorine concentration in the presence of much larger concentrations of inert gases, and the study of the effect of halogens and gaseous discharges in halogen mixtures on metal surfaces were made. This research will contribute to a better understanding of the operation of the Geiger Counters.

#### MICROWAVE RESEARCH

# Investigations of Microwave Paramagnetic Resonance

Using radio energy in the microwave region (radar waves) in conjunction with a powerful electromagnet it is possible to produce absorptions of the radio beam by a chemical material placed simul-

taneously in the path of the beam and the magnetic field. Measurement of the frequency of the radio beam and of the strength of the magnet yields important information on the location of the atoms within the chemical and also of the forces that hold atoms together in chemicals.

#### **THERMODYNAMICS**

#### Specific Heats of the Alkali Haldis

This experiment is concerned with the measurement of the compressibility of potassium chloride. This in conjunction with the enthalpy, measured the year before, now will enable other thermodynamic quantities of interest to the physicist and chemist to be calculated.

#### THEORETICAL PHYSICS

#### Statistical Mechanics and Particle Theory

The purpose of this program is to investigate theoretically the behavior of the elementary particles that constitute the basic constituents of all matter. In the "statistical" aspect the behavior of collections of large numbers of particles are being studied such as magnetism, irreversible processes in fluids, and specific heats. The program has been expanded to include theoretical studies on the nature of the basic interactions between elementary particles.

### Energy Momentum Tensor of the Electromagnetic Field in Matter

The purpose of this investigation is to determine the exact nature of the energy momentum tensor of the electromagnetic field. Recent research supports either of two forms of this quantity which differ radically in their descriptions of the rotational interaction of the electromagnetic field and the matter in which this field is propagated.

# Creation of Mesons by High Energy Colliding Nucleons

Refinements in calculations according to the Heisenberg theory were carried out. The calculations were extended from one to three dimensions and a special type of solution of the non-linear equations was formed.

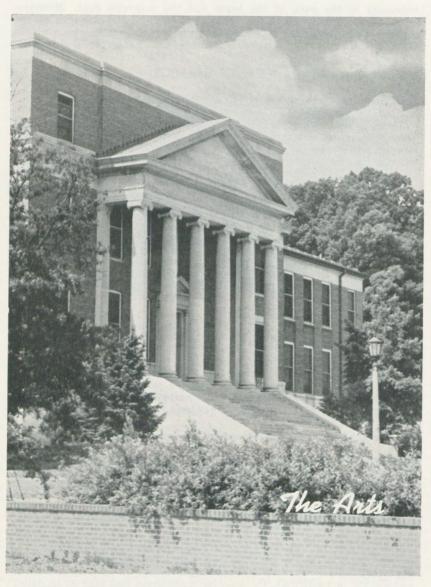
# Dirac's New Electrodynamics

The purpose of this work was to find solutions in Dirac's older and present form of his new theory, but the solutions found so far were physically trivial. The energy momentum tensor of the theory was investigated; in particular, the angular momentum was studied in detail.

#### **Publications**

"Angular Momentum in Dirac's New Electrodynamics." Richard W. Iskraut. Nature 1125, 170 (1952).

"Apparent Absence of Low Energy Cosmic Ray Primaries." S. F. Singer. Nature 170, 62 (1952) (with J. A. Van Allen).



Entrance to the College of Arts and Sciences

"Casuality and Dispersion." J. S. Toll (with J. A. Wheeler). In preparation for submission to *Physical Review*.

"Cosmic Rays and the Sun's Magnetic Field." S. F. Singer. Symposium on Solar Physics of the Covegno Volta, Academia dei Lincei, Rome (1952).

"Dielectric Constants and Permeabilities of Nickel and Cobalt Ferrites at 9430 M.C." R. A. Anderson. Submitted to *Physical Review*.

"Diurnal Variations of Cosmic Rays and the Sun's Magnetic Field." S. F. Singer. Nature 170, 63 (1952).

"Dynamic Currents and Conductivities in the Earth's Upper Atmosphere." S. F. Singer (With W. A. Bowen and E. Maple). Nature 170, 1093 (1952).

"Effect of Temperature on the Duration of <sup>3</sup>P<sub>2</sub> Metastable State of Neon." A. D. Krumbein and F. A. Grant. *Physical Review 90*, 59 (1953).

"Exploration of the Upper Atmosphere with Rockets." S. F. Singer. A chapter in the volume "Vistas in Astronomy." Published as a supplement to the *Journal of Atmospheric and Terrestrial Physics*. Pergamon Press (1953).

"Measurement of the effect of Chlorine treatment of the work function of Titanium and Zirconium. A. D. Krumbein (with H. Malamud). Submitted to Journal of Applied Physics.

"Meteorites and Cosmic Rays." S. F. Singer. Nature 170, 728 (1952).

"Meteorites as Cosmic Ray Meters." S. F. Singer. *Physical Review* 90, 168 (1953).

"Physics of the High Atmosphere." S. F. Singer. Nature 171, 146 (1953).

"Radiative Corrections to forward Compton Scattering." J. S. Toll. Paper delivered to annual meeting of American Physical Society, January 30, 1953. *Physical Review* 90, 372 (1953).

"Relations Between Cosmic Rays and Meteorites." S. F. Singer. Memories de la Soc. Roy. Sciences Leige, 4th Series, Vol. 13, 1953.

"Remarks concerning a paper by Wilker." R. W. Iskraut. Helvetica Physica Acta 305, 25 (1952).

"Research in the Upper Atmosphere with sounding Rockets and Earth Satellite Vehicles." S. F. Singer. *Journal of the British Interplanetary Society* 11, 61 (1952).

"Some Remarks on the life history of Meteorites." S. F. Singer. Astrophysical Journal (in press).

"Synoptic Rocket observations of the Upper Atmosphere." S. F. Singer. Nature 171, 1108 (1953).

"Variation of Line Width of OCS with Rotational Transition and Temperature." R. S. Anderson. In preparation.

# H. DEPARTMENT OF PSYCHOLOGY

#### ANXIETY

# The Effects of Manifest Anxiety on Timed Test Scores

This study is designed to investigate the effects of high levels of anxiety on timed test scores. Students tested during the rush and con-

fusion of orientation week will be called in for selected re-tests. Manifest anxiety scores have already been obtained, or will be obtained, at the time of re-testing. Differences between scores obtained at entrance and on retesting, if found, will be related to scores on the measure of manifest anxiety. This problem is critical in the case of entering college students who are assigned to class sections on the basis of such test scores. It is equally critical in the military services where career planning and classification are based on time test results.

#### ATTITUDE

# A Study of the Relationship Between Attitude and Related Verbal Meanings

This investigation is concerned with determining quantitatively the meanings that words have for persons using them. The results should provide an additional technique for the measurement of attitude, namely, the number of associations that individuals have to relevant verbal symbols of that attitude.

### An Experimental Definition of the Concept of Attitude

This experiment is designed to provide a crucial test of G. W. Allport's definition of attitude—a state of readiness which determines responses. For this purpose forty conservatives, forty liberals, and forty middle-of-the-roaders are being asked to complete a series of specially constructed sentences, written to coincide with, and contradict, their attitude. Results to date indicate, as expected, that the subjects react in predictable ways regardless of the conditions imposed.

# Factors Affecting Free Association as a Function of Attitude

This study indicates that associative output to a stimulus word is a function both of the word's familiarity and its relevance to the attitude continuum. Strength of attitude was not related to associative output in any systematic way.

#### COUNSELING

#### Vocational Interests and Socio-Economic Status

This study was designed to throw additional light on the general problem of socio-economic status and its relations to vocational interests. It also investigated the nature of the Occupational Level key associated with the Strong Vocational Interest Blank for Men. It was found that several different interest groups did differ significantly on the Occupational Level key. Those with verbal-linguistic interests (lawyers, journalists, advertising men, etc.) tended to have above average aspirations for status; those with sub-technical interests (farmers, policemen, forest-service men, etc.) had below average aspirations.

# A Study of Changes in Client Attitudes Toward Counseling as a Result of Counseling

The purpose of this study is to measure the changes in client attitudes—expectations about the counseling process—before and after counseling.

#### FATIGUE

#### Behavior Decrement Under Conditions of Stress

The purpose of these experiments is to determine the effects of various conditions of stress and motivation on a variety of types of behavior of military and industrial importance. The first year of the research program was devoted to an intensive analysis of the effects of fatigue on human efficiency. The second year's work has been directed towards more complex situations and tasks. The results of these studies have indicated that behavior will change significantly as a result of motivation and stress, and these changes can be predicted with a fair degree of accuracy.

#### HUMAN ENGINEERING

# A Study of the Relationship Between the Physical Arrangement of Stimuli and Learning

The results indicate that the arrangement of stimuli is significant, regardless of the type of material presented, and other factors such as previous reading habits exert an important influence.

#### Studies on Food Aversion

The purpose of this project is to study the frequency and nature of food aversion in the normal student population. It is an attempt to discover the empirical relationships which exist between food aversions and certain historical and behavioral characteristics of the individual.

#### Studies in the Electrical Stimulation of Taste

This experiment attempted to duplicate earlier findings on the electrical stimulation of taste sensations, but the results differed. As a result of this and other similar studies the question of discrete taste sensations corresponding to primary taste qualities stimulated by periodic electrical impulses remains open.

# Pointer Location and Accuracy of Dial Reading

The purpose of the experiment was to determine the relationship between accuracy of dial reading in short time exposures and the sector and the specific location of the dial pointer. The results indicate that there are no important differences in accuracy of reading among the dials, and sector location was not important. Fewer errors were made at the 9, 12, 3, and 6 o'clock positions than at the other intermediate points.

#### Studies in Color Vision

It was concluded, after investigations with 110 normal and 26 deficient subjects, that the response time measures (American Optical Co. Pseudo-Isochromatic Plates) could be used in the selection of normal from color defective individuals.

#### INDUSTRIAL PSYCHOLOGY

# Biographical Studies of Executives in Two Industrial Samples

This is a study of biographical information of executives in the companies chosen by the National Planning Association for their research in the "Causes of Industrial Peace." Personal histories of these executives are being compared with those of executives in another industrial sample to determine whether there are important differences.

# Communication Patterns in Certain Executive Jobs

A study of frequency, direction, and duration of communications emanating from and received by individuals in certain executive positions.

# The Use of Biographical Information in Selecting Driver-Salesmen for the Baking Industry

This is a study of application blanks and other sources of biographical information relative to driver-salesmen of The City Banking Co. of Baltimore. This investigation indicates that there are certain personal history items associated with job success.

# Psychological Variables in Relation to Industrial Organization Structure

This is an investigation of absenteeism, employee turnover, accident data, grievances, and other variables among centralized management groups as contrasted to decentralized groups.

#### LEARNING

# The Effects of Different Methods of Test Introduction and Interpretation on Learning in the Interview

This study is designed to test the value of several different methods of test introduction and interpretation with regard to client learning. It is assumed that client learning will be maximized when these methods are used in the best combinations. The results are intended to apply explicitly to the vocational counseling problem by pointing up the best methods for test introduction and interpretation. Since the underlying problem is the imparting of information, however, the results may also have use in a wider variety of interview situations.

# Perceptual Recognition of Verbal Material as a Function of Differential Sub-Threshold Presentation

This research is designed to measure the effects of sub-threshold exposure to Turkish words upon the subsequent recognition thresholds of observers for these words. Research in social perception has indicated that observers may react to sub-threshold stimuli (stimuli below their level of conscious awareness) in such a way as to modify their overt reactions.

# The Ability of Highly Motivated Individuals Without Language Training to Achieve Better than Chance Scores on Selected Army Language Proficiency Tests

On the basis of tests taken by Maryland students who were offered prizes for high scores, and who were selected as having had no experience with the subject languages; it was concluded that the tests were generally too difficult to be "broken" by untrained individuals.

# Strength of Attitude as a Determinant of Perceptual Selectivity

The study related the recognition thresholds of observers for religious words with their attitudes toward religion and the church. The results supported the concept of "perceptual defense" as a reaction to negatively-valued stimuli.

# Visual Recognition Thresholds of Unfamiliar Words as a Function of Prior Auditory or Visual Presentation

There is considerable evidence to indicate that the readiness with which individuals perceive English words is a function of the frequency of occurrence of such words in the language. This study will control the frequency of presentation of Turksh words to subjects who will later be required to recognize the words at short, tachistoscopic exposure durations. The results of this study should have some bearing on the more general problem of whether visual or auditory experience has a more compelling influence on the habits and expectations of individuals.

### Effects and Mechanism of Sound Induced Seizures in Mice

This investigation which produced several important disclosures in regard to the physiological mechanism of sound-induced seizures in mice is now being expanded to include the effects of sound induced seizures on learning behavior in mice.

#### MENTAL HEALTH

# The Mental Health Film in Community Discussion Group Situations

The objective of this project is to record systematically the reaction of community discussion groups to a number of mental health films currently in use. Discussion following presentation of a film will be taperecorded and later subjected to content analysis.

#### MOTIVATION

# The Use of the Cooperative Mechanics of Expression Test in Sectioning in English Classes

The Cooperative Mechanics of Expression Test measures a substantial part of the materials presented in the first course in English

which emphasizes grammar and usage. It was decided on the basis of the results to try out a policy of excusing those students who scored in the upper 10% from the first course, and putting them into the second course in English where they would presumably encounter new and challenging materials. A follow-up investigation is in progress which will determine the success of these students in the second course.

# The Use of the Cooperative American History Test in Sectioning History Classes

This study is along the same lines as the one dealing with the English tests discussed above. The tests have been given to two successive entering classes and the first group is now taking history. At the end of the year sufficient data will be available for analysis to determine the feasibility of sectioning classes.

# Academic Achievement Motivation at Different Ability Levels

This is a study of achievement motivation and the factors that influence the individuals in making use of their abilities.

#### **PERFORMANCE**

### Effects of Drugs on Performance

The purpose of this investigation was to determine the effect of ipral sodium in therapeutically adequate dosages on the performance of normal healthy subjects. A secondary purpose was to ascertain whether the Link Trainer could be used as experimental apparatus for this purpose. The presence of wide individual differences indicates that caution should be exercised in prescribing the drug as medication. The decision should be based on clinical information on the effect of the drug on the particular patient.

#### PERSONALITY

# Personality Ratings as Influenced by Verbal Stimuli

The purpose of the project was to determine whether the context in which personality ratings are made would influence the ratings obtained. Verbal context of varying sorts were provided and personality ratings were obtained. Some influence on the ratings was obtained for the verbal context, indicating the role of verbal behavior on personality ratings.

# Personality Disorganization

This study is concerned with the nature, causes, and treatment of personality disorganization. In general, the position is taken that personality organization is defined by examining man's needs and capacities and determining the extent to which these are allowed expression in a given cultural framework. Where the culture provides insufficient oppor-

tunities for need satisfaction, or where it encourages the development of incompatible needs, behavioral disturbances will invariably result.

### Problems of Adjustment

This project was undertaken for the U. S. Civil Service Commission to aid the State Department, Mutual Security Agency (FOA), Army, Navy, and Air Force. The objective of this study was to analyze the problems of adjustment of government employees assigned to foreign countries, and to develop valid and practical methods to be used in selecting employees for all overseas posts and all types of positions. The results of the study produced several valid instruments and techniques to be used in personnel selection, the most practical of which is an extensive inventory of individual activities, interests and preferences.

#### PSYCHOLOGICAL WARFARE

# An Empirical Analysis of the Effectiveness of Psychological Warfare

Studies were made in Korea on Chinese and North Korean Prisoners of War to determine the relative influence of the psychological warfare material they had received upon their degree of defection and willingness to surrender at the time they had been taken prisoner. The results indicated that psychological warfare had a definite effect on defection and surrender rates.

#### **PSYCHOPHYSICS**

# Studies in Multidimensional Psychophysics

In this series of studies a mathematical technique is being developed and tested to determine the number of independent dimensions or attributes which normal individuals perceive in a complex group of stimulus objects. The results of this technique to date indicate that it can achieve valid results in solving problems of human perception and esthetics by determining the various manners in which stimuli are arranged.

#### SOCIAL BEHAVIOR OF ANIMALS

### Studies of Social Dominance in Animals

This experiment is a study of the effect of variations in group size and composition on feeding dominance in a stable flock of goats. It is one of a series of studies of social behavior (and sexual behavior) in goat groups.

# Studies of Methods of Testing Social Dominance in Animals

The purpose of this experiment is to determine the relationships between dominance orders established in several related situations. The results indicate that social dominance in dogs was situation specific, and that generalizations of typical dominance could not be made.

#### TESTING

### The Development of a Test of Achievement in College Algebra

The problem of screening and sectioning in mathematics is more difficult than in most academic fields. A test of achievement in algebra is being developed which will measure the students' knowledge of the field so that sectioning can reflect their level of training.

### Publications (In Progress)

"Factor Analysis of Bodily Measurements on Cows: A Study in Bovimetrics," T. G. Andrews and Willard Green. In preparation.

"Job Analysis and Evaluation," A. H. Ayers. In preparation.

Motivation of Behavior, C. N. Cofer. A book in progress.

The Nature and Measurement of Ability. J. W. Gustad. Textbook in preparation.

Elementary Statistical Methods, R. C. Hackman. Textbook in preparation.

"The Effects of Enforced Early Weaning of Non-Nutritional Sucking in the Dog," Sherman Ross and J. P. Scott. Report in preparation.

#### Published

Methodes de la Psychologie, T. G. Andrews. Presses Universitaires de France, Paris, 1952, (2 Vols.). Earlier book translated into French.

"Professional Aspects of Psychological Science," T. G. Andrews, A. W. Ayers, C. N. Cofer, R. C. Hackman, R. K. Heinz, and Sherman Ross. Seminar at the University of Maryland. *American Psychologist*, 1953, in press.

Problems and Methods in Modern Psychology, T. G. Andrews and Sherman Ross. Book in preparation on contract with John Wiley and Sons, Inc.

"An Empirical Analysis of the Effectiveness of Psychological Warfare," T. G. Andrews, D. D. Smith, and L. A. Kahn. *Journal of Applied Psychology*, in press.

"Transfer and Generalization of the Inhibitory Potential Developed in Rate Serial Learning," T. G. Andrews, C. N. Cofer, and Solomon Shapiro. American Journal of Psychology, in press.

"Personality Ratings as Influenced by Verbal Stimuli," C. N. Cofer and J. T. Dunn. *Journal of Personality*, 1952, 21, 223-227.

"Proceedings of the Twenty-Third Annual Meeting of the Eastern Psychological Association," C. N. Cofer. *American Psychologist*, 1952, 7, 536-543.

"Standardization of Nomenclature Describing Audiogenic Seizures in Mice Used as Test Material," H. Frings, M. Frings, J. L. Fuller, B. E. Ginsburg, Sherman Ross, and E. M. Vicari. *Behavior*, 1952, 4, 157-160.

"Perceptual Defense in Normal and Schizophrenic Observers," Elliott McGinnies and Joseph Adornetto. *Journal of Abnormal Psychology*, 1952, 833-837.

"Employee Counseling: Requirements and Results," J. W. Gustad. In A. W. Ayers, (Ed.) Proceedings of the Second Annual Conference for Maryland Industries, University of Maryland, 1953.

"Vocational Interests and Socio-Economic Status," J. W. Gustad. To appear in the *Journal of Applied Psychology*.

"The Definition of Counseling," J. W. Gustad. In R. F. Berdie, (Ed.) Roles and Relationships in Counseling, University of Minnesota Press, Minneapolis, 1953.

"Graphs and Statistics," R. C. Hackman. To appear in Compton's Pictorial Encyclopedia.

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"Selection Methods for Overseas Employees," M. M. Mandell, T. G. Andrews, U. S. Civil Service Commission, August, 1953, pp. 95.

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"The Status of Comparative Psychology," Sherman Ross and Wendell Smith, in *Contemporary Psychology*, A. A. Roback (Ed.). To be published by Philosophical Press.

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"The Hoarding Behavior of the Mouse. II. The Role of Deprivation, Satiation and Stress," Sherman Ross and Wendell Smith, *Journal of Genetic Psychology*, 1953, 82, 299-307.

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"Opportunities for Psychological Research at the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine," Sherman Ross and J. P. Scott, Journal of General Psychology, 1953, 48, 87-89.

"Psychology, The Science Talent Search and High School Teaching," Sherman Ross and J. W. Gustad, American Psychologist, in press.

"The Critical Frequency for Taste," Sherman Ross and John Versace, American Journal of Psychology, 1953, 66, 496-497.

"A Review of the Literature on Tests of Stereoscopic Vision," Sherman Ross and J. L. Fletcher, Quarterly Review of Phthalmology. In press.

"Pointer Location and Accuracy of Dial Reading," Sherman Ross, Lou Della Valle, and William Ray, *Journal of Applied Psychology*, 1953, 37, 131-135.

"Response Time as an Indicator of Color Deficiency," Sherman Ross and J. L. Fletcher, Journal of Applied Psychology, 1953, 37, 211-213.

"Psychologists by the Thousands," Sherman Ross, American Psychologist, 1953, 8, 158-160.

Comments on "The Bacteria and Odor Control Problem in Occupied Spaces," by R. L. Kushner and Sherman Ross. Transactions of the American Society of Heating and Ventilating Engineers. In press.

"A Note on Dominance Tests," Sherman Ross, Journal of Genetic Psychology. In press.

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"Hoarding Behavior in Adrenalectomized Hamsters," Wendell Smith, A. J. Krawczum, N. J. Wisehaupt, and Sherman Ross, Journal of Comparative and Physiological Psychology. In press.

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### I. DEPARTMENT OF SOCIOLOGY

#### ANTHROPOLOGY

### A Guide to the Literature of Southwestern Anthropology

This is a compilation of a complete bibliography of all aspects of the anthropology of the Southwest culture area including northwest Mexico. It will be annotated and presented with appraisals of the results of research thus far, and suggestions as to the most important lines for future research.

### EDUCATION, HABITS AND ATTITUDES

# Changes in Rule-Behavior Among Freshmen College Students

The purpose of this study is focused on the relationship between certain types of group identification in college and student behavior concerning church attendance and smoking. This study may reveal the influence (or lack of influence) of peer group identification on the individual's behavior.

# Attitudes Toward Property in College Students

This study is designed to determine what influences conservative and unusual notions about property.

#### HOUSING

# A Study of Housing Segregation

This is a detailed study and analysis of census material as a guide to city planning.

# The Construction of an Intra-City Index of Segregation

This investigation is designed to answer the question, "Where do non-white minorities move to?" For this purpose census characteristics of segregated areas in a large city are being studied to demonstrate changes in the past ten years.

#### INDUSTRIAL SOCIOLOGY

### The Professionalization of Business Management

This is a study of the degree of professionalization that is apparent in a group of top managers according to type of business. An investigation of managers of real estate firms is now in progress.

#### RURAL SOCIOLOGY

#### Evaluation of the 1952 Rural Women's Short Course

The Rural Women's Short Course study contributed to changes made in organizing the 1953 event, and a final report is now in progress. It is believed more changes will occur based on analyses reported in the final study.

### Selected Social and Economic Characteristics of Maryland's Farm Population, 1950

This study is a digest of the 1950 census concerning Maryland population by counties. It should be of practical value to extension workers, school teachers, ministers, and others in developing community programs.

### SOCIAL PSYCHOLOGY

# A Critique of Komarovsky's Concept, "Cultural Contradictions"

This is an analysis of several studies of Komarovsky and others indicating questionable assumptions and procedures in the studies and a reformulation of the concept. This investigation will contribute to the theoretical formulations in the social psychology of role behavior.

# Life Patterns of Extremely Active Participants in Voluntary Associations

This investigation is a study of the careers of a selected group of women who are known as community leaders. It will contribute to an understanding of phenomenon of leadership and the learning of social roles.

# An Analysis of the Concept of "Role" in Social Psychological Literature

This survey of the literature is to determine how the concept of "role" is used and its relationship to "attitude."

# The Relationship Between General and Specific Conceptions of Roles

An empirical study based on the administration of the Role Conception Inventory to determine the methodological value of certain types of questionnaire statements.

### An Ecological Study of Casualty Roles

The city of Chicago was divided into five hierarchized socio-economic areas. Twenty-five rates of armed services casualties in World War II are examined for differences among stratified areas.

### A Social Psychological Study of Humor

An experiment designed to make discriminatory judgments as to what is humorous, and a sociological classification of types of humor.

#### THE FAMILY

# Some Characteristics of the Family in Prince Georges County

One of the most important contributions of this family study is the highly significant conclusion that adults' activity in formal organizations does not preclude their being highly active in the family group.

# Social Participation of 1300 Families in Prince Georges County

Eight types of families, rural and urban, are compared as to their informal family participation, and as to their participation in formal (organized) associations.

### URBAN SOCIOLOGY

# Urban Reading Habits

A sample study of the reading habits of families in the urban areas of Prince Georges County was made to aid in library planning.

#### **Publications**

Lejins, Peter P., "The Death Penalty Abroad", Annals of the American Academy of Political and Social Science, Vol. 284, Nov. 1952, pp. 137-146.

Lejins, Peter P., "Is the Youth Authority Idea Really Paying Off?", Proceedings of the National Conference of Juvenile Agencies, Vol. 47, 1951, pp. 87-93.

Lejins, Peter P., "Recommended Pre-Service Training and Education for Custodial Officers", Proceedings, 81st Congress of Correction, 1951, pp. 128-135.

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Motz, Annabelle B., "The Role Conception Inventory", American Sociological Review, Vol. 17, No. 4, August 1952, pp. 465-471.

Hoffsommer, Harold (with Houser and Galloway), "Rural Reading Habits", Bulletin A69, Agricultural Experiment Station, University of Maryland, College Park, 1952. (Bulletin.)

Hoffsommer, Harold, "Health Culture Patterns of Rural People, Public Health Nursing", Vol. 44, No. 6, June 1952, (lead article, pp. 309-314).

Marches, Joseph R. and Turbeville, Gus, "The Effect of Residential Propinquity on Marriage Selection".

Rohrer, Wayne C. and Taylor, Carl C., (2 chapts.) in Rural Social Systems and Adult Education published by Michigan State College Press.

Rohrer, Wayne C., "Labor Use in the 1952 Truck Crop Harvest on Maryland's Lower Eastern Shore", Maryland Agricultural Experiment Station.

Rohrer, Wayne C., "Selected Social and Economic Characteristics of Maryland's Farm Population," Maryland Agricultural Extension Service (in process).

Fitzgerald, Sherman K., a short report on, "The Wage Rates of Laborers Harvesting Truck Crops on the Eastern Shore of Maryland".

Roth, Norman R., "The Leadership Structure of a Suburban Community with Particular Reference to the Community of 'Rurbantown'" (in process).

Roth, Norman R., "The In-Service Preparation of Pupil Personnel Workers".

Roth, Norman R., "Perspectives in Pupil Personnel Work".

Hoffsommer, Harold, The Sociology of American Life (book in process).

# J. DEPARTMENT OF ZOOLOGY

### CHESAPEAKE BAY RESEARCH

# A Determination of the Biological Properties of Animals Important to the Fisheries of Chesapeake Bay

This project is supplying information for efficiency in fisheries operation, which is dependent on intimate knowledge of all factors involved in the life of the animals that are exploited.

### ENERGY METABOLISM OF MAMMALS

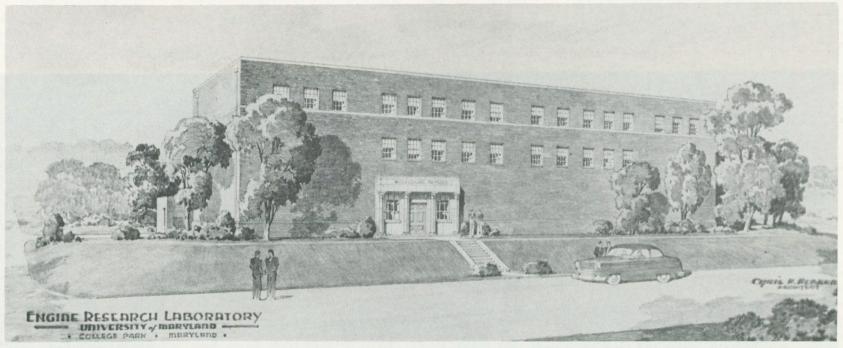
# The Investigation of Respiration and Metabolism of Mammals

This work consisted of a number of studies in energy exchange in mammals involving the effect of humidity temperature and low pressure. During the work, a thermal respirator was developed which is being further tested by the U. S. Navy for field use.

#### FATIGUE AND EXERCISE

# To Elucidate Further the Nature of the Oxygen Debt in Vertebrates

Work with trained and untrained animals demonstrated that trained animals were better able to withstand the increased lactic acid concentrations associated with large oxygen debt. These findings are important in understanding problems of fatigue and exercise.



Engine Research Laboratory Building, devoted entirely to research

### FISH

A Study of the Productivity of Greenbelt Lake Relative to the Fish Population and Development of Management Policies for Impounded Waters

Observations have been made monthly on the temperature, oxygen content, carbon dioxide content, pH, mineral acidity, alkalinity, turbidity, color, and plankton of the fish in Greenbelt Lake.

# GENETICS

A Study of Serological and Genetic Differences in Various Strains of Rats

Four strains of rats resulting from crosses of white rats and wild rats have been developed. Further study will provide basic information for the understanding of blood groups, immune reactions, allergic reactions, and related phenomena.

# TICKS

The Collection of Specimens and Information Concerning the Ticks of the World and the Classification of This Material

Information concerning ticks, and collections of ticks from all over the world, is being correlated for the purpose of gaining greater understanding and for classification. This information concerning ticks is important to public health and agriculture.

### **Publications**

Allen, J. Frances. "Factors influencing the distribution of four species of clams in Annemmessex River, Chesapeake Bay." *Ecology*—approx. 6 pp.

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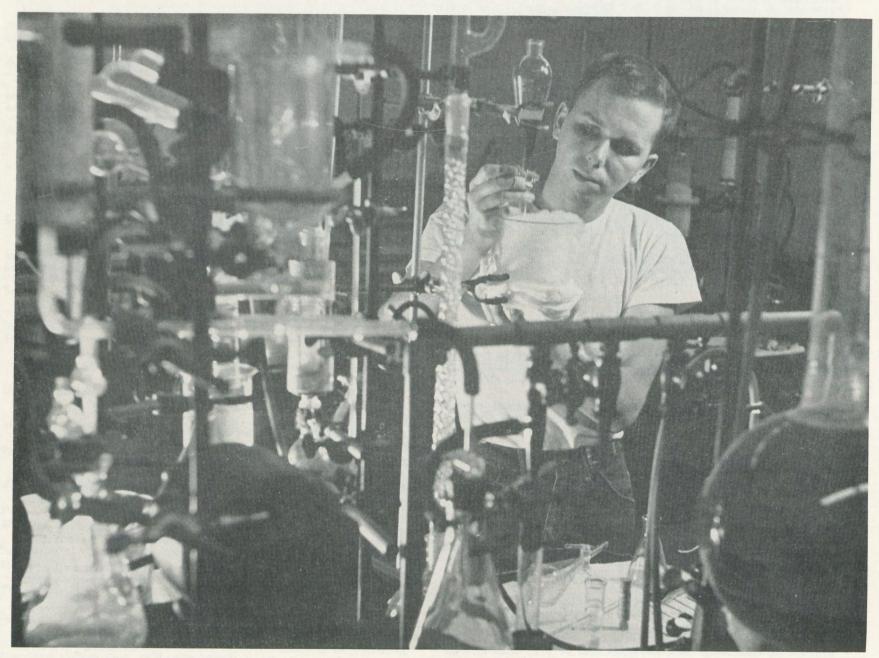
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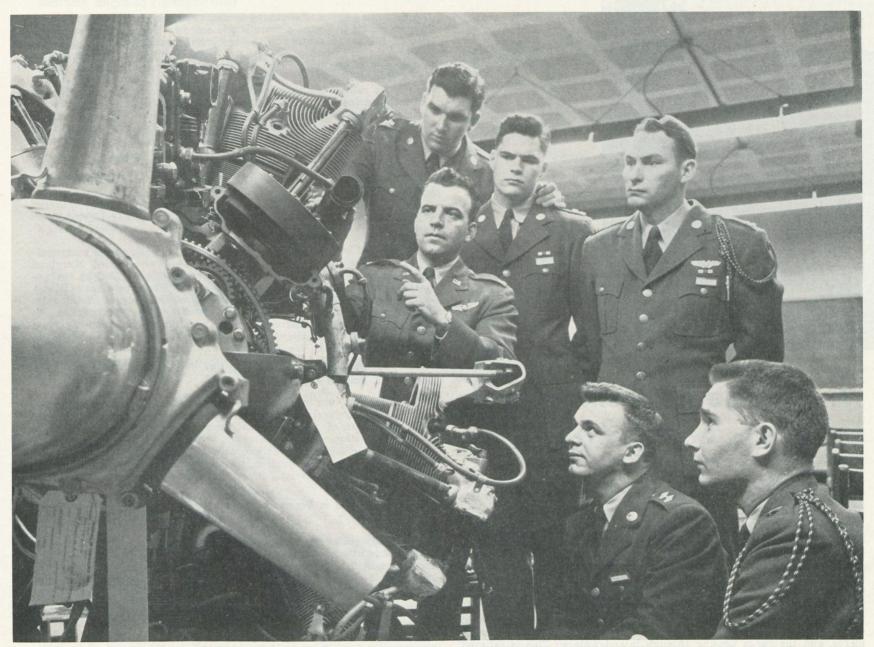
Clark, R. H. and R. A. Littleford, "Growth indicies and growth of the hard clam, *Venus mercenaria*, in Pocomoke Sound." *Growth*—approx. 8 pp.

Downes, K. M. and R. A. Littleford, "Seasonal variation in copper and manganese in the oyster in upper Chesapeake Bay." *Jl. Mar. Res.*—approx. 10 pp.

Littleford, R. A. "Seasonal Growth in zero class menhaden (Breevortia tyrannus) in Chesapeake Bay." Copeia—note 2 pp.



In the Laboratory of the College of Arts and Sciences



Air Force ROTC Cadets at a Lecture on Research in the Mechanism of Flight



Entrance to the College of Business and Public Administration

# V. College of Business and Public Administration

# A. BUREAU OF BUSINESS AND ECONOMIC RESEARCH

The Bureau collects and edits up to date data on business changes that affect the State of Maryland and the Port of Baltimore. Its investigations are published as part of a series entitled "Studies in Business and Economics." During the past year the following studies have been published.

# Baltimore in Coastwise Trade—September, 1952, Volume VI, No. 2

The emphasis of this report was centered upon the competition in coastwise trade among various ports, the commodities in Baltimore commerce, and the cargo passing through inland waters. This is believed to be the first comprehensive study published in this field.

# Maryland Economic Indices-December, 1952, Volume VI, No. 3

A dynamic picture of changing business conditions in Maryland over a 30 year period indicates a more stable economy than the composite picture of 141 urban centers in the rest of the country. The speculative boom of the late twenties and the resulting crash was much more violent in the rest of the country as indicated in the national series. Maryland's relative stability is particularly noticeable in the cycles of department store sales. Changes in the cycles of electric power production and total employment in Maryland coincide in timing and in direction of movement, suggesting a combination of barometers which will provide a ready check on current economic tendencies. Analyses were made of the rates of new firms and discontinuing firms to the number of firms in operation. In addition it was concluded, assuming continuance of the relationship of the last 30 years, direction of turns of Baltimore bank debits may be used to indicate turns not only in Maryland, but in the country as well.

# Maryland Unemployment Compensation: Some Industry Experience—March 1953, Volume VI, No. 4

As part of a comprehensive analysis of unemployment compensation experience in Maryland, eight significant and varied Maryland industries were selected for analysis of benefit claims filed by the unemployed, and the exhaustion of benefit rights. The experience of Maryland in relation to other states was detailed in analyses of the relation of unemployment compensation expenditures and contributions to the insurance fund. Constructive recommendations were proposed for a more adequate and secure system for potential business recessions.

# Developed and Undeveloped Countries in International Economics—June, 1953, Volume VII, No. I

Basic criteria are suggested in this study for distinguishing developed from undeveloped countries. This study emphasizes the practical application of the theoretical concepts in such areas as national policies and interpretation of changes, the impact of varying social systems, interrelations of the development of industry, agriculture, trade, employment, costs of production, prices, tariffs, exchange and currency controls, and foreign investment and inter-government loans.

# Scientific Method in Business: Some Observations—September, 1953, Volume VII, No. 2

This study points out certain characteristics of research including attributes and attitudes of the researcher, with illustrations of the experience of individuals. In addition it contains an analysis of certain research methods and illustrates their application to specific experience.

# RESEARCH IN PROGRESS

# The Future of Coal in Maryland (Tentative Title)

This study of the declining coal industry, its competitive energy

sources, and the possible rehabilitation is now under investigation. Southern Maryland (tentative title)

This project has just been initiated and will include the important commodity, tobacco.

Individual Research in Progress

John H. Cover, under a Fulbright award, undertook a study of the implementation of the economic development program of India.

# B. BUREAU OF GOVERNMENTAL RESEARCH

# MUNICIPAL PROBLEMS

# Charter Suggestions for Maryland Municipalities

This handbook of charter suggestions for Maryland municipalities (or unincorporated areas considering incorporation) was designed for local governments desirous of establishing a modern, efficient, and democratic city government in conformity with Maryland local government traditions and concepts.

# Proposed Incorporation of Glen Burnie

This report was prepared for the commissioners of Anne Arundel County, and relates to the important factors involved in the municipal incorporation proposed for the area of Glen Burnie. This study analyzes in detail governmental structure and powers of the proposed area, the expenditure level, revenue prospects, and other major aspects of the proposed incorporation. It serves not only the needs of Glen Burnie residents in clarifying the nature and implications of the specific incorporation proposal they are considering, but the report also establishes guide posts for other areas of Maryland considering incorporation.

### INDIVIDUAL RESEARCH

# City-County Fiscal Relations by Don L. Bowen

This report analyzes the problems and proposed solutions of citycounty fiscal relations and applies the experiences of other jurisdictions to Maryland needs.

### WORK IN PROGRESS

### How States Find Out About Their Tourists

This report is being done for the Maryland State Department of Information and analyzes the administrative organization and procedures which states use in discerning the nature, extent, and value of their tourist trade.

# Economic Indicators of Maryland Counties

This report is being done for the Committee on Financing of Maryland Health Activities and involves a compilation of basic economic indicators relating to the ability of Maryland counties to support governmental functions.

# C. DEPARTMENT OF BUSINESS ORGANIZATION

# MARKETS AND MARKETING

Consumer Buying Motives and Buying Habits, Suburban Maryland—Washington, D. C.

This study indicates where and when consumers spent their incomes with a view toward aiding in the location of shopping centers in the Maryland suburban areas. This study is serving as a model not only for further studies in the Washington area, but in other parts of the country as well.

# Running Your Business With Communications

This study was made for the Small Defense Plant Administration and was designed to aid the small business in the use of the various forms of communicating with employees, customers, and others.

### TRANSPORTATION

# National Cooperative Project of the Transportation Association of America

This study is designed to arrive at areas of agreement among the competing forms of transportation with a view toward making the necessary changes in our national transportation policy.

# Operating Rights of Motor Carriers

The purpose of this investigation was to provide an analysis and delineation of the Interstate Commerce Commission's decisions regarding operating rights of property carriers.

### **Publications**

"REA—Airlines Agreement Gets Temporary O.K.", John H. Frederick, Distribution Age, July, 1952.

"What About Subsidies?", John H. Frederick, Distribution Age, August, 1952.

"What Future For General Merchandise Warehousing?", John H. Frederick, Distribution Age, September, 1952.

"Nationalization: It Might Happen Here", John H. Frederick, Railway Progress, November, 1952.

"Dangers of Government Control of Transportation", John H. Frederick, Oregon Business Review, October, 1952.

"What Has Happened to Air Cargo?", John H. Frederick, Distribution Age, March, 1953.

"A Critical Analysis—National Transportation Policy", John H. Frederick, National Defense Transportation Journal, March-April, 1953.

"Prospective Developments in Federal Regulation of Transportation", John H. Frederick, American Economic Review, May, 1953.

"Consolidate Now to Meet Competition", John H. Frederick, Distribution Age, June, 1953.

Economics and Public Utilities, Eli W. Clemens (Japanese edition of the first half of a book under the same title previously published by Appleton-Crofts, New York).

"Public Power Policy of Maine", Eli W. Clemens, American Economic Review, December, 1952.

"Use of Trade Area Data by Local Distributors", J. Allan Cook, Proceedings of the Frederick, Maryland Marketing Conference.

Business Law Text and Cases, Earl W. Mounce. To be published by D. C. Heath & Co. in May, 1954.

"Efectos del Ciclo Economico en el Presupesto de Publicidad", Irving I. Raines, Revista Tecnica de Administración (Mexico), September, 1952.

"How Six Dailies Would Meet Doubling of Postal Rates", Irving I. Raines, Journalism Quarterly, Fall, 1952.

"Criticism of O.P.S. Cost and Accounting Procedure", Charles T. Sweeney, Journal of Accounting, March, 1953.

"Trucking Jubilee Year", Charles A. Taff, Motor Transportation, January, 1953.

"When to Use Standard Costs in Pricing Procurement Contracts", Howard W. Wright, *Journal of Accounting*, August, 1952.

"Defense Contract Accounting Requirements." Howard W. Wright, *The Stove Builder*, September, 1952.

# D. DEPARTMENT OF ECONOMICS

# AMERICAN INDUSTRY

# The American Jeweled Watch Industry

This study enscopes the following areas: (1) a historical survey and analysis of the present organization of the American and Swiss jeweled watch industries; (2) an analysis of the American watch market and the relative roles of domestic producers and assemblers (importers of Swiss movements) in this market; (3) a discussion of public policy with respect to this industry.

# An Economic Analysis of the Introduction of Diesel Locomotives in American Railways

This study concerns the influence of technology on industry and of the usefulness of modern economic analysis in measuring the effects of technological change.

# THE CORPORATION

# Federal Incorporation: A Supplement to the Anti-Trust Laws

This investigation concerns the two main social problems which have accompanied the extension of the corporation: (1) the separation of ownership and control within the corporation; and (2) the concentration of economic power. The major portion of the study is concerned with proposals that Congress use its powers to charter corporations engaged in interstate commerce in order to exercise social control over railroads and monopolies.

# ECONOMIC DEVELOPMENT AND POLICY

# Capitalism After 1850

This study entails broad interpretation of the main developments in the economy of western Europe between 1850 and 1914. Specific attention is given to the rise of mass production, the return to protective tariffs, the growth of cartels and other forms of business monopoly, and the growth of trade unions.

# Institutional Economics and National Policy

This study analyses the development and policy implications of the public-private enterprise system in various parts of the democratic world. The problems of economic instability and expansion are dealt with in terms of an over-all economic program which combines various types of economic measures.

# The Economics of Stability, Growth, and Sustained Defense

The problems of maintaining a large defense program are being studied in terms of the effect of this program on economic stability and economic growth.

# Capital Accumulation, Employment and Stability

This investigation is concerned with the problems of a growing economy. The problems include: (1) the requirements for maintaining steady growth of national income free of the instability of the business cycle; and (2) the implications of differential rates of growth in the economy's labor supply and its stock of capital goods.

# **ECONOMIC THEORY**

# Ricardo in Retrospect

This is one of a series of studies concerning the great economist in which the criteria for the validity of a system of economic theory is advanced. The hypothesis is that the test of the validity of economic theories cannot be made by direct appeal to facts, but must make an indirect appeal through the type of policy for which the theory is an argument. The thesis of this study is that Ricardo's theory of production and distribution was an argument for repeal of the British Corn Laws.

# INTERNATIONAL TRADE

# The Restoration of Sterling Convertibility

This investigation examines the meaning and conditions essential to the establishment of "minimum" convertibility in sterling. The restoration of sterling convertibility would be a major step towards the development of a world economy in which supply and demand could freely operate via international markets.

# International Trade and Finance

The balance of payments is used as a starting-point for the subsequent analysis in which a balance between the theoretical (abstract) and the descriptive (concrete) is sought.

# MONETARY AND FISCAL POLICY IN RELATION TO EMPLOYMENT, INCOME, AND PRICES

# The Theory of a Monetary Economy

This study is an interpretation of the fundamental thought of John M. Keynes. The thesis of the study is that Keynes explained unemployment in terms of the essential properties of money.

# Fiscal Policies for Full-Employment

This investigation concerns the various expenditure and taxation policies of the federal government that may be used to achieve a full-employment national income.

# Excess Liquidity and European Monetary Reforms

This study analyzes the measures that were taken in Europe to reduce the money supply and other liquid holdings, and the relation between excess liquidity and total spending.

# Fiscal Policy in a Growing Economy

This study is concerned with the manner in which fiscal weapons may be used to achieve a steady growth of output, and with the types of fiscal policies that can increase or decrease the rate of output growth.

# Income Growth in Secular Stagnation and Inflation

This is an analysis of the behavior of savings and investment during long-run periods of growth characterized by surplus capacity and unemployment, and during periods marked by labor and capital shortages.

# Steady Growth and Theories of the Business Cycle

This study explains the lapses from steady growth principally in terms of the irregularity of the innovation process, and compares this analysis with certain important alternative explanations of lapses from steady growth.

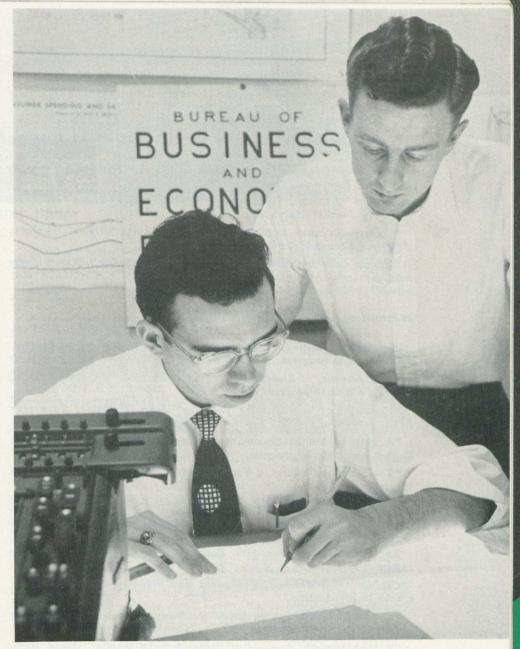
### **Publications**

"Ricardo in Retrospect", Dudley Dillard, Journal of Economic History, Winter, 1953.

"The Theory of a Monetary Economy", Dudley Dillard. To be published by the Rutgers University Press in a volume entitled *Inflation*, Deflation, and Economic Stability.

"Capitalism After 1850", Dudley Dillard, publication forthcoming in January, 1954, by Columbia University Press in a volume entitled Chapters in Western Civilization, Vol. II.

"Institutional Economics and National Economic Policy", Allan G. Gruchy, an essay in a volume to be published by the Lucknow University Press, India.



Working on a Business and Public Administration Research Project

"Fiscal Policies for Full-Employment", John G. Gurley, Journal of Political Economy, Vol. LX, No. 6, December, 1952, pp. 525-33.

"Excess Liquidity and European Monetary Reforms, 1944-1952", John G. Gurley, *American Economic Review*, Vol. XLIII, No. 1, March, 1953, pp. 76-100.

"Full Capacity vs. Full Employment", Daniel Hamberg, Quarterly Journal of Economics, August, 1952.

"The Accelerator in Income Analysis", Daniel Hamberg, Quarterly Journal of Economics, November, 1952.

"1948-49 Recession Reexamined: A Rejoinder," Daniel Hamberg, Economic Journal, March, 1952.

"Underemployment Equilibrium Rates of Growth", Daniel Hamberg, American Economic Review, June, 1952.

"Income Growth in Secular Stagnation and Inflation", Daniel Hamberg, Economic Journal, September, 1953.

# In Progress

Economic Development of the North Atlantic Community, Dudley Dillard, a book in progress.

The Economics of Stability, Growth, and Sustained Defense, Allan G. Gruchy, a book in progress.

"Fiscal Policy in a Growing Economy", John G. Gurley. To appear in the Journal of Political Economy, December, 1953.

"A note on the Diagrammatics of Some Growth Models", John G. Gurley, an article in progress.

"The Monetary Effects of Fiscal Policies", John G. Gurley, an article in preparation.

National Income Analysis, John G. Gurley, a book in progress.

"Economic Role of the Middle Class", Henry W. Grayson, a number of articles in preparation.

The Principles of Economics, Henry W. Grayson, a book in preparation.

Capital Accumulation, Employment and Stability, Daniel Hamberg, a book in preparation.

"Steady Growth and Theories of the Business Cycles", Daniel Hamberg, an article in progress.

"A Diagrammatic Analysis of Recent Growth Models", Daniel Hamberg, an article in preparation.

"The American Jeweled Watch Industry", Walter S. Measday, manuscript in preparation.

"An Economic Analysis of the Introduction of Diesel Locomotives in American Railways", Hugh S. Norton, manuscript in progress.

"Federal Incorporation: A Supplement to the Anti-Trust Laws", Edward A. Robinson, manuscript in preparation.

"The Restoration of Sterling Convertibility", Franklin R. Root, an article in preparation.

International Trade and Finance, Franklin R. Root, a book in progress.

# E. DEPARTMENT OF GEOGRAPHY

# AMERICAN GEOGRAPHY

# American Geography—Inventory and Prospect

This study is sponsored by the National Research Council and the Association of American Geographers to review the background and principal trends of the various phases in the field of geography in the past century. A member of the staff, as Chairman of the Committee on Physical and Biogeography, has responsibility for the following chapters: Geography of the Oceans; Hydrology; Soil Geography; Climatology; Geomorphology; Plant Geography; Animal Geography; Physiological Climatology; and Medical Geography.

# ATLASES

# The Forest and Fish Resources of the World

Atlases of mineral, agricultural, and forest and fish resources have not been published in any language for the last three decades. This series will contain an extensive text and is designed for use by professional men, students, businessmen, researchers, and others interested in the basic resources of our modern economy.

# Atlas of China

This study will depict the basic geographic elements of China including as follows: topography, drainage, climate, soils, vegetation, land use, peoples, population, agriculture, mineral resources, transportation, trade, and other areas.

# Census Atlas Project

This regional summary will include the countries of Middle and South America with data relative to physical and cultural geography, history, economics, transportation, and other fields. The general introductory sections of national atlases and the specific statistical data by countries and county subdivisions is based primarily upon the 1950 Census of the Americas.





SCENES FROM INDIA

Ferry Crossing at Bihar in North India

# At the Holy City of Benares

### INDIA

# An Analysis of Irrigation Patterns in the Gangetic Plain

Investigations in the Gangetic Plain of India were primarily concerned with the existing conditions of irrigation and agricultural operations in many rural districts in Uttar Pradesh and Bihar.

# INDUSTRIAL DISTRICTS

# Organized Industrial Districts

This study is based on a comprehensive survey of all organized industrial districts in operation in this country. It will provide a practical guide for communities and private groups who want to know how to establish and develop a planned industrial district (industrial subdivision) including details on site selection, layout techniques, zoning and control, cost, financing, and management and promotion policies.

# MARYLAND

# Natural Regions of Maryland

A series of wall maps of Maryland will contain the following: Natural Regions of Maryland, Main Types of Farming and Fishing Industries of Maryland, Transportation Facilities of Maryland, Distribution of Population in Maryland, Industrial Development, Mining, and Quarrying in Maryland, and the Chesapeake Bay Region.

### METHODS OF GEOGRAPHY

# Scientific Methodology of Geography

This investigation is a critical evaluation of the major approaches of geography and methods of geographical research as currently practiced in the United States and other countries of the world.

# Publications

Atlas of the World's Resources, Vol. II. Mineral Resources of the World, William Van Royen and Oliver Bowles, Prentiss Hall, Inc., for the University of Maryland, 1952.

Atlas of the World's Resources, Vol. I. Agricultural Resources of the World, William Van Royen (in collaboration with the Bureau of Agricultural Economics, U.S.D.A.) in press.

"Oliver Edwin Baker, 1883-1949", Charles Y. Hu and S. S. Visher. *Annals of the Association of American Geographers*, Vol. 49, No. 4, 1950, pp. 308-334.

Revision of article on Japan for the *Encyclopaedia Britannica*, Charles Y. Hu, 1952.

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"Planning for Industrial Growth", Victor Roterus, 1952 Spring Conference on Local Planning and Zoning. Detroit Metropolitan Area Regional Planning Commission. June, 1952.

"Patterns and Problems of Land Tenure in the Lesser Antilles", John P. Augelli. To be published by Economic Geography, abstract already

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"San Lorenzo, Case Study of Migrations in Puerto Rico", John P. Augelli, The American Journal of Economics and Sociology, Jan. 1952.

"The Country-To-Town Movement in the West Indies", John P. Augelli. Abstract to be published by the *Union Geographique International*.

"Algunas Perspectivas Geopoliticas en la Historia de Puerto Rico", John P. Augelli, *Revista Colegial*, University of Puerto Rico publication, Feb. 1952.

"Rural Settlement Types in Interior Puerto Rico", John P. Augelli, The Journal of Geography, Vol. 51, Jan. 1952.

"Sugar Cane and Tobacco: A Comparison of Agricultural Types in Interior Puerto", John P. Augelli, *Economic Geography*, Vol. 28, Oct. 1952.

Review of book, "The Caribbean: Peoples, Problems, and Prospects", John P. Augelli. To be published by *Economic Geography*.

"New Zealand Fisheries: A General Survey", Donald J. Patton. New Zealand Geographer, Vol. 8, No. 2, 1952.

"American Inland Waterways: Traffic and General Transport Relations", Donald J. Patton. Abstract published in the Annals of the Association of American Geographers, Vol. 42, 1952.

"A Map of Traffic Flow on American Inland Waterways", Donald J. Patton. To be published as one of a series of Office of Naval Research studies. Map and accompanying article have been completed and submitted.

"Transportation on American Inland Waterways", Donald J. Patton. Article almost completed, to be submitted to *Economic Geography* for publication.

"Fellowships and Research Grants Available to Geographers for Overseas Travel and Study", Donald J. Patton. To be published in the *Professional Geographer*, probably January, 1954.

"The Naugatuck Valley", John C. Herbst, Ph.D. dissertation. University of Michigan, Ann Arbor, Michigan, 1953.

"General Aspects of the Geography of Irrigation in India", David Firman, *The Geographer*, April, 1953, Aligarh, India, University of Aligarh Press.

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# Work in Progress

Research on the Forest and Fish Resources of the World, William Van Royen, the third and last part of the Atlas of the World's Resources.

Atlas of China, Charles Y. Hu, a book in progress.

Geography of East Asia, Charles Y. Hu, a textbook in preparation. Scientific Methodology of Geography, Charles Y. Hu, a book in progess.

Geography of Middle America, F. Webster McBryde, John P. Augelli and probably Jorge Vivo of Mexico, a book on the geography of Latin

America in progress.

A New Type of Urban-Rural Map, F. Webster McBryde, in preparation.

A New Equal-Area World Base Map, F. Webster McBryde, in preparation.

A New System of Climatic Classification, F. Webster McBryde, in preparation.

Organized Industrial Districts, Victor Roterus, a manuscript in progress.

Resources Development and Geography, Victor Roterus, a paper in preparation.

"Rural Settlement in Puerto Rico", John P. Augelli, Chapter in Land Utilization in Puerto Rico. To be published by the University of Puerto Rico under the editorship of Clarence F. Jones.

"The Port of Baltimore", Donald J. Patton, manuscript in preparation. "Eastern Shore Ports and Chesapeake Bay Shipping", Donald J. Patton, manuscript in preparation.

Historical Geography of Maryland and Adjacent Areas, John C. Herbst, research in progress.

"An Analysis of Irrigation Patterns in the Gangetic Plain", David Firman, doctoral dissertation in progress.

# F. DEPARTMENT OF OFFICE TECHNIQUES AND MANAGEMENT

# BUSINESS EDUCATION

Business Education in the Secondary Schools of Oklahoma, 1951-52

This study was designed for a two-fold purpose. First, it is organized to present in detail the status of business education in Oklahoma as revealed in the business-subject offerings, the student enrollments, the academic preparation of teachers, and the job assignments of teachers. Second, this study is designed to reveal how certain specific practices followed in business education in Oklahoma compare with the generally accepted theories of business educators.

# ORGANIZATION AND MANAGEMENT

# An Organization Case Study of the Office of the Controller in the Mutual Security Agency

This study is an evaluation of the Office of the Controller from the viewpoint of the processes of organization and management involved in the operation. The analysis included specific study of the (a) objectives of the Controller's Office, (b) its authority, organization and operation, (c) planning and budgeting management, (d) personnel management, (e) public relations, and (f) the coordination of all the activities towards the ends sought.

### **Publications**

Transcription Method Shorthand, Speed and Production Drills, Arno F. Knapper, co-author, Wm. C. Brown, Publishers, Dubuque, Iowa, 1953.

"Professionalization of Subject Matter", The Balance Sheet, Eileen T. Costello, April, 1953.

"My Favorite Devices for Teaching Shorthand", Jane H. O'Neill, Business Education World, Gregg Division, McGraw-Hill Publishing Company, June, 1953.

# G. DEPARTMENT OF GOVERNMENT AND POLITICS

# CIVIL RIGHTS

# Comparative Features of the Guarantees of the Rights of the Citizen

The laws and practices of various countries, including the United States and the forty-eight states, relating to the guarantees of the private and public rights of the citizens are being studied for the purpose of discerning similarities and differences. Special emphasis is placed upon the newer rights such as labor rights and other economic and social rights of the individual, as well as group rights such as those pertaining to labor organizations, political parties, and other associations.

# Government Powers of Investigation

The growth of modern government has been accompanied by an expansion of governmental investigatory and fact-gathering activities. At the same time, the democratic tradition places great stress on the citizens' rights of privacy. This study seeks to analyze this conflict between government and citizen with special emphasis on the constitutional aspects of the problem.

# FAIR EMPLOYMENT PRACTICES

# The Administration of Selected States and Local Fair Employment Practice Programs

This study involves an examination and evaluation of the administrative practices utilized and special problems encountered in the application and enforcement of fair employment practice legislation through six state and municipal programs.

# FOREIGN POLICY

# Influence of Non-Congressional Pressure on Foreign Policy

This study analyzes the contributions of pressure groups in foreign policy, with emphasis on the effect in Congress.

# INTERNATIONAL RELATIONS

# International Relations: Basic Documents

This study illustrates the basic processes in the conduct of international affairs and includes the substance of various important documents. Emphasis is placed upon materials illustrative of United States' conduct of its world affairs.

### POLITICAL PARTIES

# The West Virginia Delegation to the Republican National Convention, 1952

The study analyzes the movements in the 1952 Primary campaign in West Virginia with emphasis on the struggle by delegates at the Republican Convention, and the role of the delegation in state and national politics.

# Work in Progress

Readings in Comparative Political Thought, Thornton H. Anderson.

Comparative Features of the Guarantees of the Rights of the Citizen, Joseph R. Starr.

The West Virginia Delegation to the Republican National Convention, 1952, Franklin L. Burdette.

For Encyclopedia Americana, Franklin L. Burdette, 1953 materials on "Maryland," "Baltimore," "Democratic Party," and "Republican Party."

"The Fifth Amendment and Federal Immunity Statutes", Robert G. Dixon, accepted for publication by the George Washington Law Review.

"The 'Contractual Agreements' and Changing Allied-West German Relations", Elmer Plischke.

"The Legal Status of American Political Parties", Joseph R. Starr.

### Publications

Burdette, Franklin L., editor (Political Science Series editor, D. Van Nostrand Company), Government in Rural America, 2nd ed., by Lane W. Lancaster, 1952. Public Personnel Management, by William G. Torpoy, 1953. Governments of Latin America, by Miguel Jorrin, 1953.

International Relations: Basic Documents, Elmer Plischke, 1953.

The Allied High Commission for Germany, Elmer Plischke, Historical Division, Office of U. S. High Commissioner for Germany, 1953.

"Selected Articles and Documents on American Government and Politics," Franklin L. Burdette, published quarterly in the American Political Science Review.

"Influence of Noncongressional Pressures on Foreign Policy," Franklin L. Burdette, *The Annals*, September, 1953.

"Presidential Selection: Time for a Change?", published in Selecting the President, Robert G. Dixon, Jr., The Twenty-Seventh Discussion and Debate Manual, 1953, National University Extension Association.

"Reactivation of Prewar German Treaties," Elmer Plischke, American Journal of International Law (forthcoming issue).

# VI. College of Education

# INSTITUTE FOR CHILD STUDY

The program of the Institute is centered in collecting, interpreting, and synthesizing the scientific findings in the various disciplines concerned with human growth, development, learning, and behavior. In addition, the members of the Institute communicate this synthesis of concepts to teachers, parents, and others in practical fields which need such understanding as a basis for their practice and planning.

# **EDUCATION PROCEDURES**

# Study Program for 27 South American Rural Educators Completed

This experimental program is designed to determine how best to assist persons from different cultures, and to develop a core of democratic values as guides in solving their own educational problems. The techniques employed included group discussions, visiting of schools and other educational institutions, and lectures from the fields of education, sociology, anthropology, and psychology.

# The Effect of United States Policies on Post-War German Universities

An investigation of the effect of the policies pursued by the occupation forces in promoting democratic practices in German universities is under study.

### PHYSICAL EDUCATION

# A Study of the Teaching, Coaching, and Extra-Curricular Responsibilities of Physical Education Teachers in Maryland Secondary Schools.

In order to plan a curriculum for training undergraduate students a study is in progress measuring the time spent by teachers in teaching physical education and other classes, in intramurals, in coaching, and in directing recreational activities in the school and community, as well as determining the kinds of activities coached and directed.

### SCHOOL ADMINISTRATION

# Developing Educational Policy for an Individual School

Investigations are in progress to develop the theory and procedures in which a school principal can work effectively and democratically with a school staff in constructing educational policy

### VOCATIONAL EDUCATION

# Inter-American Seminar on Vocational Education

The Seminar was sponsored by the U. S. Government (represented by the Institute of Inter-American Affairs and the U. S. Office of Education), the Organization of American States, and the International Labor Organization. The purpose was stated as follows: "To study the manpower situation in the Americas from the point of view of the problems of vocational education and pre-university technical education (Agricultural, Industrial, Business, and Education for Home and Family Life), for the purpose of improving vocational training methods and facilities and thereby providing additional skilled workers, increased production, and higher living standards in the Western Hemisphere."

# **PUBLICATIONS**

### Published

"Internships in Nursing," Clarence A. Newell, The American Journal of Nursing, June, 1953.

"Internships in School Administration," Clarence A. Newell, *The Nation's Schools*, November, 1952.

Publications Accepted. Three articles by Clarence A. Newell which will appear in the October, December, and February issues of The National Elementary Principal during 1953-54. Analyzing some important additions to theory and corresponding practical applications developed to help beginning school principals.

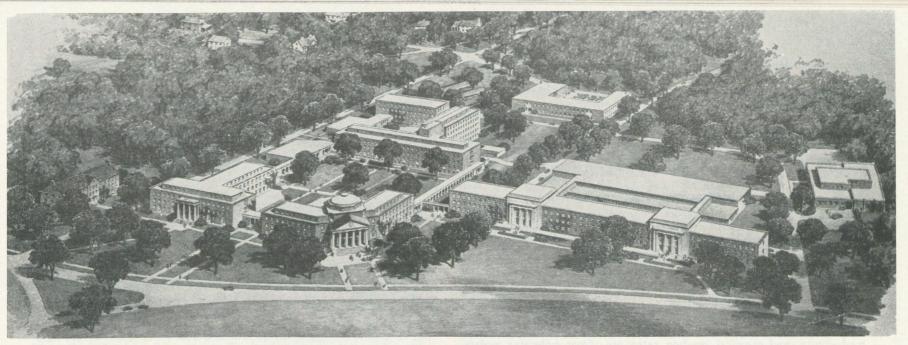
"Administrators Learn Democratic Behavior", Clarence A. Newell. Scheduled for publication in the November (1953) issue of *Educational Leadership*.

# In Progress

Superior Practices in Industrial Arts Teacher Education. A Yearbook of the American Council on Industrial Arts Teachers Education. R. Lee Hornblake and Donald Maley.

A public relations book with particular reference to public schools stressing the importance of such areas as public opinion and propaganda is being written by James A. Van Zwoll.





Glenn L. Martin College of Engineering and Aeronautical Sciences

# VII. Glenn L. Martin College of Engineering and Aeronautical Sciences

A. INSTITUTE FOR FLUID DYNAMICS AND APPLIED MATHEMATICS

AERODYNAMICS

Study of High Speed Stability and Control

Unsteady flight may cause wasteful failure of an aircraft or missile, or inaccuracy in shooting and bombing. The purpose of this investigation is to study the vibration of flutter on gas turbine blades and stalling flutter of wings.

APPLIED MATHEMATICS AND MATHEMATICAL PHYSICS

Investigation of Hydrodynamics, Aerodynamics, Elasticity, Numerical Analysis, and Partial Differential Equations

A. Hydrodynamics. Upper and lower bounds for the added mass acquired by an immersed body have been obtained by various methods

including a new process of symmetrization in which the given body is replaced by two symmetric bodies. A new mathematical connection between the added mass and the electrical polarization has been established. The general problem of the cavity flow past a plate has been solved.

B. Aerodynamics. A solution has been found to be the problem of wave propagation due to initial disturbances for a general class of equations which include the problem of transonic flow. The mathematical treatment of plane shock waves has been reduced to the solution of a classical problem in mathematics.

C. Elasticity. A new method for the estimation of torsional rigidity has been successfully applied to various shapes of hollow beams. A mathematical theory of cracks, punches, and dislocations has been developed. The important problem of the error estimate in the determination of frequencies of vibrations has been successfully treated.

D. Numerical Analysis. A numerical method has been given for obtaining upper and lower bounds for solutions of important difference equations.

E. Partial Differential Equations. Important uniqueness theorems in generalized potential theory have been discovered. These theorems serve as a tool in numerous investigations. The classical procedure in separation of variables has been extended to deal with more difficult problems in mathematical physics.

# COMPRESSIBLE JETS, SHOCK AND TURBULENCE

Basic Research in High Temperature Gasdynamics, Hypersonic Flows and Turbulence

The feasibility of using the shock tube techniques for studying the

properties of high temperature gases has been established. Shock tubes have been designed to study shock wave phenomena from Mach. No. 6 to 40. Experimental evidence has been obtained of the existence of photoionization preceding strong shock waves.

Experimental and theoretical work is nearing completion on an optical study of compressible jets.

Electronic analogues to turbulence have been constructed, and hot wire apparatus is being built. The turbulence wind tunnel is nearing completion, and this will facilitate further turbulence studies.

# **THERMODYNAMICS**

# Studies in Statistical Physics

The general aim of this project is to develop an understanding of the behavior of materials on the basis of the interactions of the atoms and molecules of which they are composed. Most of the emphasis is on the investigation of phase transitions and of the statistical mechanics of non-equilibrium phenomenon. Progress has been made in the more difficult phenomenon associated with the rate at which the various processes predicted by thermodynamic methods occur. Included in the long range research program are the calculations of heat conductivity, electrical conductivity, and chemical reaction rates, etc., from molecular models.

# Additional Projects

Hyperbolic Analytic Geometry—conducted by S. B. Jackson and D. Greenspan.

A Lemma on Monotone Arcs—conducted by S. B. Jackson.

The Four Vertex Theorem for Space Curves—conducted by B. Y. Koo. Isentropic Motion of a Monatomic Gas, in a Closed Tube—conducted by S. N. Schot.

Some Non-Linear Transformations and Their Application to Slowly Convergent and Divergent Series—conducted by D. Shanks.

The Compressible Flow About a Pointed Body of Revolution of Curved Profile With Attached Shock Wave—conducted by G. L. Spencer, II.

Generalized Riemann Invariants—conducted by G. S. S. Ludford.

On the Order of Convergence of Solutions of a Difference Equation to a Solution of the Diffusion Equation—conducted by M. L. Juncosa and D. M. Young.

# **PUBLICATIONS**

# Technical Reports

Melville S. Green and Richard F. Wallis, "Note on a Quantum Mechanical Theory of Plasma Oscillations", November 1952.

J. Mayo Greenberg and Elliott W. Montroll—B-16, "On the Theory of Electron Diffraction by Molecules Containing Heavy Atoms", Office of Naval Research, August 1952.

Gordon F. Newell and E. W. Montrol—BT-10, "On the Combinatorial Approach to the Ising Model", December 1952.

Louis Witten—BT-13, "A Generalization of Yang and Lee's Theory of Condensation", Office of Naval Research, June 1953.

Miriam (Lipschutz) Yevick—BT-8, "On Strong Bounds for Sums of Independent Random Variables Which Tend to a Stable Distribution", October 1952.

George Yevick—BT-7, "Quantum Theory of the Organized Behavior of Many Particles with Long-Range Forces, October 1952.

Gordon F. Newell, "Vibration of a Simple Cubic Lattice, March 1953.

# Papers in Progress

- R. Betchov, On the Stability of Isotropic Turbulence. On a Model of Turbulence, Technical Report BT 2, June 24, 1952. Office of Air Res.
- R. M. Davis, D. C. Pack and D. Bershader, Structure of a Two-Dimensional Supersonic Jet Discharging from a Nozzle at Overpressure with Mach Number—1.4.
- S. I. Pai, Supersonic Rotational Flow over Two-Dimensional Ogives, presented at 3rd Mid-Western Conference of Fluid Mechanics at University of Minnesota, March 22-24, 1953. A Note on Hypersonic Viscous Flow over a Flat Plate, to be published in Journal of the Aeronautical Sciences.
- E. L. Resler, Jr., and A. Ritter, Shock Waves above Mach No. 40, waiting experimental verification.
- E. L. Resler, Jr., and Stuart Hoenig, Probe Studies in High Temperature Gases Produced by Strong Shock Waves.

# Papers Published or Accepted for Publication

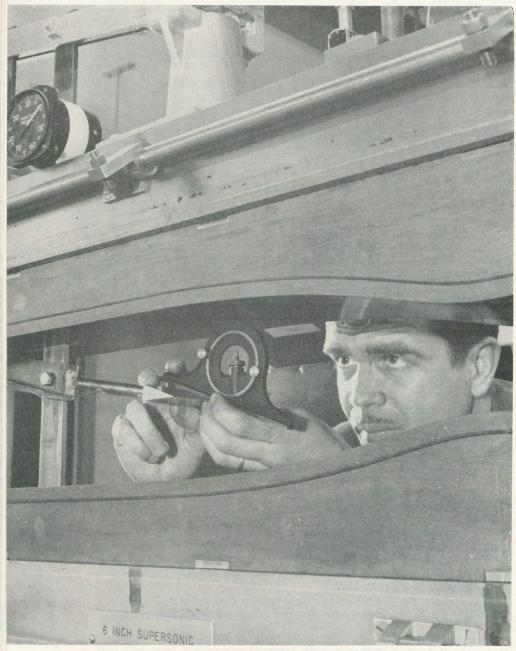
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- J. B. Diaz, The Singular Initial Value Problem for the Euler-Poisson-Darboux Equation, Proceeding of the American Mathematical Society (in print).
- J. B. Diaz, On Numerical Bounds for the Solution of the Dirichlet Difference Boundary Value Problem, Journal of Mathematics and Physics, Vol. 31, 1953.
- J. B. Diaz, Rieman's Method and the Problem of Cauchy II. The Wave Equation in n Dimensions. Proceedings of the Amer. Math. Soc. 3 (1952), pp. 476-483.
- R. A. Good, and D. W. Hughs, Associated Groups for a Semigroup, Bulletin of the American Mathematical Society, Vol. 58, No. 6 (1952).
- R. A. Good and R. P. Eddy, On the Iterative Solution of a System of Equations, published as NAVORD Report Number 2577 (August, 1952).

Melville S. Greene, "Markoff Random Processes and the Statistical Mechanics of Time-Dependent Phenomena", *Journal of Chemical Physics*, Vol. 20, No. 8, 1281-1295, August 1952.

- D. W. Hall and G. L. Spencer, *Elementary Topology*. To be published by John Wiley and Sons.
- A. Huber, On the Uniqueness of Generalized Axially Symmetric Potentials, Annals of Mathematics (in print).
- A. Huber, A Theorem of Phragmen-Lindeloef Type, Proceedings of the American Mathematical Society (in print).

- G. S. S. Ludford, Sur une difficulte dans la methode de Riemann, Comptes Rendus de l'Academie des Sciences, 236 (1953), 2293-2295.
- G. S. S. Ludford, On an extension of Riemann's Method of integrative with applications to one-dimensional gas dynamics. Proceedings of the Cambridge Philosophical Society, 48 (1952), 499-510.
- G. S. S. Ludford, The extension of a two-dimensional subsonic flow of the Joukowski force of ideal fluid theory, Proceedings of the 1st U. S. National Congress of Applied Mechanics, 1952, 715-721.
- G. S. S. Ludford, On unsteady flow of compressible viscous fluids, with H. Polachek and E. J. Seeger, Journal of Applied Physics, 24 (1952), 490-495.
- G. S. Ludford, D'Alembert's paradox and the moment formula in three-dimensional subsonic flow, Revue de la Faculte des Sciences de l'Universite d'Istanbul, A18 (1953, 1-13).
- G. S. S. Ludford, Two topics in one-dimensional gas dynamics, to appear in the R. von Mises Anniversary Volume, 1953.
- G. S. S. Ludford, Extensions in the applicability of Riemann's formula, to appear in Journal of Rational Mechanics and Analysis, January 1954.
- G. S. S. Ludford and M. N. Martin, "Anisentropic flows in a shock tube," Apr. 1953. To appear in the Communications on Pure and Applied Mathematics, Feb. 1954.
- M. H. Martin, Riemann's Method and the Problem of Cauchy II. The Wave Equation in n Dimensions. Proceedings of the Amer. Math. Soc. 3 (1952), pp. 476-483.
- M. H. Martin, A Generalization of the Method of Separation of Variables, Journal of Rational Mechanics and Analysis, Vol. 2, No. 2, April 1953.
- M. H. Martin, The Propagation of A Plane Shock into a Quiet Atmosphere, Can. J. Math., Vol. 5, pp. 37-39.
- M. H. Martin, The Monge—Ampere partial differential equation, Pacific Journal of Mathematics, Vol. 3, No. 1, March (1953), pp. 165-187.
- E. W. Montroll, "Markoff Chains, Wiener Integrals, and Quantum Theory Communications on Pure & Applied Mathematics—November 1952.
- G. F. Newell and E. W. Montrol, "On the Theory of the Ising Model of Ferromagnetism", Reviews of Modern Physics, Vol. 25, No. 2, pp. 353-389, April 1953.
- S. I. Pai, The Laminar Jet Mixing of Two Compressible Fluids, Proc. of 2nd Mid-Western Conference of Fluid Mechanics, pp. 297-307, September 1952.
- S. I. Pai, On Turbulent Flow between Parallel Plates, Journal Applied Mechanics, Vol. 20, No. 1, pp. 109-114, March 1953, presented at ASME annual meeting—Nov. 30-Dec. 5, 1952.
- S. I. Pai, On the Flow behind Attached Curved Shock, Jour. Aero. Sci., Vol. 19, No. 11, pp. 734-742, Nov. 1952.
- S. I. Pai and others, *Physical Phenomena in Gas Jets*, Final report submitted to the A.A.F. by the Jet Research Group of Inst. FDAM, October 1952.
- L. E. Payne, On Axially Symmetric Flow and the Method of Generalized Electrostatics, Quart. Appl. Math., Vol. 10 (1952), pp. 197-204.
- L. E. Payne, Capacity, Virtual Mass, and Generalized Symmetrization, Pac. J. Math., Vol. 2, 1952.

- L. E. Payne, On Axially symmetric punch, crack and torsion problems, SIAM Journal, Vol. 1, 1953.
- D. M. Young, "Iterative methods for solving partial difference equations of elliptic type," Nov. 1952. Accepted for publication in *Transactions of American Mathematical Society*.
- D. M. Young and M. L. Juncosa, A Uniform Approximation to Fourier Coefficients, Proc. of The American Mathematical Society, Vol. 4, pp. 373-374 (1953).
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- J. L. Walsh and David M. Young. "On the accuracy of the numerical solution of the Dirichlet problem by finite differences," Dec. 1952. Accepted for publication in *Journal of Research*, National Bureau of Standards.
- J. L. Walsh and David Young, "On the degree of convergence of solutions of difference equations to the solution of the Dirichlet problem," Apr. 1953. Accepted for publication in *Journal of Mathematics and Physics*.
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- A. Weinstein, Generalized Axially Symmetric Potential Theory, Bulletin of the American Mathematical Society, Vol. 59 (1953), pp. 20-38.
- Miriam (Lipschutz) Yevick, "Generalization of a Theorem of Chung and Feller", American Mathematical Society, Vol. 3, No. 4, pp. 659-670, August 1952.



Professor A. Wiley Sherwood checking the incline of an object tested in the supersonic wind tunnel

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# B. DEPARTMENT OF AERONAUTICAL ENGINEERING AERODYNAMICS

# Differential Analyzer

A joint project is in progress with the Electrical Engineering Department to install a differential analyzer to further research in airplane vibrations, flutter, and aerodynamics.

# Subsonic Flow About Cone Cylinders at Angles of Attack

The first model is being built in the Aeronautical Engineering shop. Experiments will be conducted in both the small subsonic tunnel and at high subsonic speeds in the supersonic tunnel, and the data will be compared with available theoretical results.

### THE BOUNDARY LAYER

# Boundary Layer Flow Visualization

A model wing has been constructed and experiments conducted in the 7.75 x 11 ft. University Wind Tunnel to indicate the extent of laminar and turbulent regions of flow in the boundary layer of the model wing. The underlying purpose is to develop a satisfactory technique of measuring comparative boundary layer characteristics on wind tunnel models, and their full scale prototypes, in order to reduce the element of uncertainty in the application of wind tunnel data to actual aircraft.

# The Transient Lift of a Swept-Back Wing

With the increase of aircraft speed toward the "sound barrier", the swept-back wing has gained popularity because of its smaller drag at speeds close to the sonic speed. The purpose of this research is to provide a theory for the prediction of lift of such a wing under arbitrary motion. A new equation was devised which greatly facilitated practical computations, and which contained no arbitrary objectionable assumptions.

# The Boundary Layer Over Very Slender Bodies of Revolution

Experiments are in progress to devise a theory of boundary layers based on slender bodies. Before the complicated phenomena of the interaction of shock-wave and boundary layer and its effect on drag can be determined, an appropriate theory of slender bodies moving at hypersonic speeds is necessary.

# THE WIND TUNNEL

# The Boundary Layer Development Along the Side Walls of a Two-Dimensional Supersonic Wind Tunnel

The purpose of this investigation was to determine how to design the throat of a two-dimensional supersonic tunnel, especially when the so-called Mach number (ratio of wind velocity to sound velocity) becomes greater than unity, i.e., in the "hypersonic" range. For the wind tunnel, the throat narrows down to a slit. It is important to know what allowance should be made to take care of the layer of slow-moving air close to the walls. This layer is usually very thin, but it may be comparable to the width of the slit at the throat. Results of the investigation showed that such is not the case. These findings will help clarify this rather important detail in the design of hypersonic wind tunnels.

# Development of Supersonic Tunnel Equipment

Statham pressure gages were installed and calibrated; this will permit the measurement of pressures on models in the supersonic tunnel with SR-4a strain gage indicator. The air duct and heating system for drying the silica gel beds in the wind tunnel air dryers were altered to permit more efficient operation. The equipment required to install an air cooled mercury arc lamp in the present Schlieren system was determined.

# Calibration of the Mach 2 Nozzle Blocks

The static pressure, total head and mach number were experimentally determined throughout the test section of the supersonic wind tunnel. Curves of these quantities were plotted versus test section coordinates. The calibration curves will aid in correcting force and pressure data taken on models tested in the wind tunnel.

### **Publications**

"Airplane Design", Gerald Corning, published by Edwards Bros., Ann Arbor, Michigan, April, 1953.

"A New Lifting Line Theory for the Unsteady Lift of a Swept or Un-swept Wing in an Incompressible Fluid", S. F. Shen, Report for Air Force Material Command.

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"Remarks on Correction for Aspect Ratio of the Iidicial Lift Functions of Wagner and Kussner", S. F. Shen, Journal of Aeronautical Sciences, September, 1952.

"Note on the Distribution of Singular Directions of a Two-Dimensional Shock", S. F. Shen, *Journal of Math. and Physics*, July, 1952.

"Flutter of a Two-Dimensional Simple-Supported Uniform Panel in a Supersonic Stream", Report for Office of Naval Research, S. F. Shen, submitted through M.I.T. Aero-Elastic and Structural Research Lab., dated August 6, 1952.

"An Estimate of Viscosity Effect on the Hypersonic Flow over an Insulated Wedge", S. F. Shen, *Journal of Math. and Physics*, Vol. XXI, No. 3, October, 1952.

"On the Boundary Layer Development along the Side Walls of a Two-Dimensional Supersonic Tunnel", S. F. Shen, Report for Naval Ordnance Lab., March, 1953.

# C. DEPARTMENT OF CHEMICAL ENGINEERING BATTERY RESEARCH

# The Development of a Low Temperature Primary Battery

Due to crystallization and solidification, batteries fail to function at temperatures in the vicinity of 0°F and lower. Studies were made of battery couples operating in ethyl alcohol-lithium chloride and methyl alcohol-lithium chloride electrolytes, using anodes of zinc and of magnesium, and cathodes made of carbon rods, acetylene black, graphite and an organic and inorganic depolarizer. Methyl alcohol-lithium chloride with depolarizers of MnO<sub>2</sub>, V<sub>2</sub>O<sub>5</sub> or quinone gave very promising results, and further work is in progress.

# Low Temperature Dry Cells

This project is designed to ascertain the possible alternative formulations for dry cells which will not freeze as low as  $-40^{\circ}\mathrm{F}$  by using organic solvents in place of water in the conducting mass of the cell. A corollary objective is the use of organic rather than mineral depolarizers with the new formulations in order to improve the performance of the cell.

### COAL CARBONIZATION

# The Thermal Changes Involved in Coal Carbonization and the Effect of Chemical Pretreatment on These Changes and Upon Coke Structure

The high cost of coke ovens is due primarily to the narrow width required to permit heat to reach properly all parts of the coal charged, but internal self-heating may greatly simplify this problem. This investigation indicated that strong exotherms could be produced during carbonization after pretreatment with air, oxygen and nitric acid. Relative to the coals tested, air and oxygen pretreatment up to a certain amount increased the quality of the coke produced. A consideration of economic factors indicates that the proper treatment may lead to autogeneous coking processes that may greatly increase the capacity of industrial equipment with a corresponding reduction in cost.

### FIRE-FIGHTING SOLUTIONS

# The Stability and Effectiveness of Water Solutions

This investigation is concerned with the development of water solutions that can be used in fire-fighting at temperatures as low as —60°F. The possibilities inherent in such solutions, such as their use as low temperature anti-freezing heat transfer properties, will also be explored.



Research in Fire Fighting and Prevention Techniques is a major function of the Fire Extension Service

# The Reaction of Carbon Tetrabromide and Hydrofluoric Acid

There is a great deal of interest in the various bromofluoromethanes as fire extinguishers and hydraulic fluids where extreme inertness and stability are required. The object of this study is to determine the product composition under various temperatures, pressures, and possible catalyst conditions.

### **HYDROCARBONS**

# Absorption of Hydrocarbons of High Volatility in Hydrocarbon Droplets

In order to evaluate the factors for the design of a spray column, the absorption mechanism for individual drops during the formation and fall within a gas-filled tower will be studied.

### HYDROGEN FLUORIDE

# Recovery of Anhydrous Hydrogen Fluoride from Waste Gases

The waste gases from superphosphate fertilizer plants, the effluent gas stream from the Simmons cell, and the effluent gas streams from the direct fluorination processes using hydrogen fluoride all contain gaseous hydrogen fluoride which must be removed because of its toxicity. A process is being investigated whereby the hydrogen fluoride is absorbed by sodium fluoride with subsequent heating of the sodium fluoride and the condensation of the hydrogen fluoride evolved.

### METALLURGY

# The Evaluation of the Impact Properties of Commercial Titanium and Titanium Alloys

This investigation concerned the impact studies, tensile studies, transformation studies, metallographic studies, and photomicrograph examination of fracture data. Many interesting and new observations of the behavior of titanium were noted, and information of importance to designers and builders of titanium structures were obtained.

# The Properties of Ductile Titanium

The impact properties of several samples of commercially pure titanium over wide range of temperatures, and tensile strength and hardness determinations were made on most specimens at room temperatures. Photomicrographic and fractographic studies were made on all specimens. Cleavage type fracture was found at moderate and low tempeartures, but an appreciable amount of plastic strain accompanied fracture. The data obtained in this study is of great value to designers of airplanes, defense weapons, and peace time equipment because titanium possesses the superior properties of high tensile strength, low weight, and high corrosion resistance.

# The Influence of Heat-Treating Variables on the Martensite Transformation in SAE 1050 Steel

This investigation was designed to determine the effect of important variables on the hardening of steel through the formation of martensite. The rate of cooling did not affect the temperature of the martensite transformation, but the rate of formation of martensite below the transformation temperature was decreased by increasing the austenite grain size.

### The Flow and Structure of Metals

This investigation of the flow and structure of metals was prompted by the fracture of Liberty ships during the last war. The flow and fracture of ferrous metals and titanium were studied. The technical determination of the behavior of metal samples under various methods of loading at various temperatures, and at various rates of energy application were made. The information permits an understanding of the underlying phenomena, thereby establishing the alloy composition (if any is required) and the safe conditions of use.

# The Application of Physical Metallurgy to Solutions of Problems in Specifications and Transportation Equipment Failure

The investigation of failures in transportation equipment were studied by metallography and collateral engineering sciences to guide specification practices. It was found that failure of transportation equipment is caused by the following factors: 1. improper heating; 2. treatment design requirements that encounter metallurgical shortcomings; 3. variations from specified practices; and 4. change.

# PERFORATED-PLATE

# A Study of Perforated-Plates in a Distillation Column

If the performance, efficiency, pressure drop, and ease in operation of the perforated-plate approaches that of the bubble-cap-plate, then the economies would favor use of the former. To evaluate the properties of the perforated-plate in a distillation column a laboratory study is in progress.

# D. DEPARTMENT OF CIVIL ENGINEERING PROPERTIES OF CONCRETE

# Effects of Fly Ash on the Properties of Concrete

Investigations including fly ash from five different sources, representing a wide range in chemical and physical, characteristics, were conducted to determine the properties of concrete relative to water requirement, air-entraining capacity, strength, volume changes, and resistance to freezing and thawing.

# Effects of Variations in Curing Conditions on the Measured Compressive Strength of Concrete

After completion of the major portion of this investigation it is indicated that failure to store specimens under proper conditions of temperature and moisture during the first few days after molding may seriously reduce the measured strength. The second portion of the tests demonstrated that different types of cement and cement-admixture combinations are affected to greatly different degrees by variations in curing conditions. The project is continuing and additional data are being gathered.

# Studies of Concrete Admixtures

These tests, along with earlier ones, indicate that air-entraining admixtures may be classified into three categories: those which do nothing more than entrain air; those which serve as accelerators as well as air-entraining agents; and those which have the so-called dispersing property which appears to benefit strength and offset the strength-reducing effect of air entrainment.

# Investigation of Concrete Truck Mixers

Tests were made on 92 full-sized batches of concrete from 11 different truck mixers. These field batches, which represented mixing conditions ranging from favorable to highly unfavorable, were subjected to extensive tests for uniformity of strength, consistency and composition. The

tests indicated that present limits on amount of mixing and mixer capacity are amply protective and somewhat conservative. Contrary to earlier belief it was found that slow mixing speeds are as effective as fast ones, the adequacy of mixing being determined by the number of revolutions.

# The Relationship of Diffusivity to the Resistance of Concrete to Sudden Temperature Changes

Coarse and fine aggregates from various sources are being incorporated into concretes and mortars of different proportions. Specimens of the resulting mixtures are being exposed to temperature changes under various conditions, and measurements are being made to determine diffusivity and rate of deterioration of the mortar and concrete.

# PROPERTIES OF GRAVEL

# Effects of Heavy-Media Treatment on the Quality of Gravel

Treatment in heavy media of the higher specific gravities resulted in worthwhile improvements of the freezing and thawing resistence of concrete for the two gravels investigated. In part, as a result of this investigation heavy media plants have been, or are being, installed by three large gravel producers.

# Studies of the Use of Gravel in Bituminous Mixtures

Aggregates of different types have been used in bituminous concretes of various proportions for purposes of comparing the density, strength and resistance to the action of water of the resulting combinations. The effectiveness of different anti-stripping agents has been investigated in standardized stripping tests with a variety of aggregates. The results to date indicate that the proportions and grading of bituminous mixtures should be established on a different basis for rounded aggregates than for angular ones. Certain anti-stripping agents have been found highly effective in improving the adhesion of bitumen to aggregates in the presence of water.

# **Publications**

Construction Surveying, Russell B. Allen, Government Printing Office, for the Department of Training Publications, The Engineer School, Ft. Belvoir, Va.

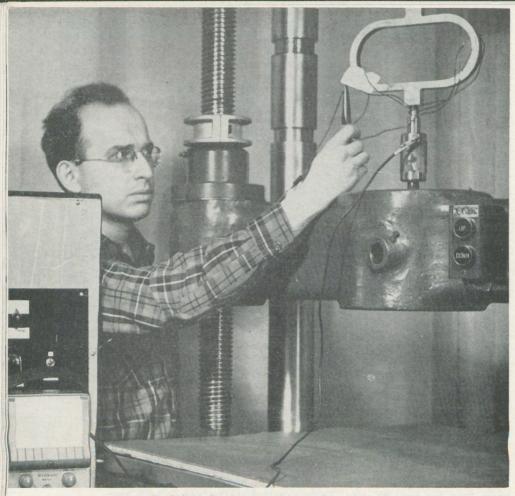
Roads and Airfields, Russell B. Allen, in preparation, for the Department of Training Publications, The Engineer School, Ft. Belvoir, Va.

"Vertical Sand Drains for Stabilizing Muck-Peat Soils," Edward S. Barber, ASCE Proceedings, 1953.

"Discussion on Deflection of Piles Due to Lateral Loads," ASTM Symposium, 1953.

Explosives and Demolition, Duane R. Keller, a U. S. Army field manual.

Roads and Airfields, Duane R. Keller, contributing author, a U. S. Army manual in preparation.



Studying the fracture of metals

Assault of Obstacles and Fortifications, Duane R. Keller, a U. S. Army field manual in preparation.

Roads and Airfields, Louis E. Otts, Jr., contributing author, a U. S. technical manual in preparation.

Descriptive Geometry for Civil Engineers, Harry W. Piper, a laboratory manual in preparation.

"Report of Committee on Education, Presidents Conference on Industrial Safety," S. S. Steinberg, Bulletin No. 153, U. S. Department of Labor, Government Printing Office, June, 1952.

"Report of 1952 UPADI Convention," S. S. Steinberg, Journal of Engineering Education, New Orleans, La., September, 1953.

"The Effect of Initial Moisture Content of Lightweight Aggregate upon Lightweight Structural Concrete," Presley A. Wedding, a paper submitted to the American Concrete Institute.

# E. DEPARTMENT OF ELECTRICAL ENGINEERING

# BASIC INVESTIGATION

# Fundamental Research

This project has as its general objective the development of a quantum theory of electric circuits, radiation resistance, and noise. These problems involve the application to electrical systems of the quantum theory of fields and thermodynamics of irreversible processes.

# ADDITIONAL PROJECTS

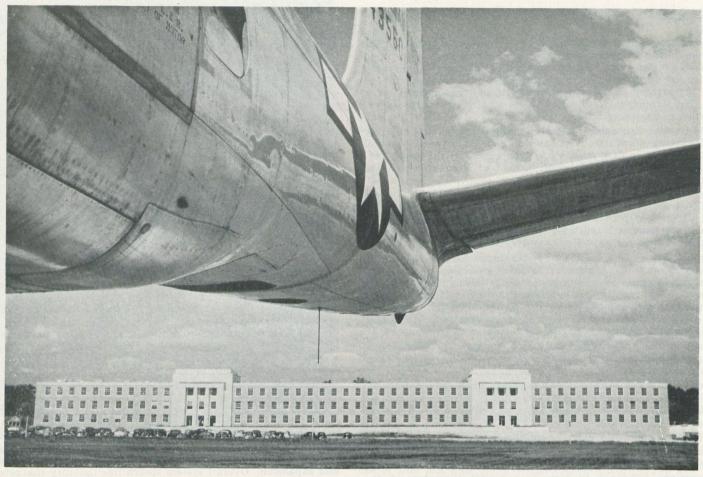
- 1. Waves in Electron Beams. The amplification properties of single and double beams of electrons have been investigated both theoretically and experimentally with a view toward better understanding the phenomena involved. Our basic knowledge of the subject has been broadened and improved as a result of this research.
- 2. Lobe Modulation Phenomena, Air-to-Air Propagation at U H F Frequencies. The serious audio-frequency interference caused in jet-plant communications by lobe modulation has been investigated both theoretically and experimentally in order that means may be found to overcome this obstacle to create satisfactory radio communications. The difficulties have been fairly well localized and remedial measures are being studied; some recommendations have been made.
- 3. Uncertainties in Electrical Measurements. A theoretical study of these uncertainties has been made and published in "Electrical Engineering Experiments" by Reed, Wagner, and Corcoran. Experimental investigation is now being planned.
- 4. Circular Polarization Studies at U H F Communications between Two Aircraft at any Attitudes. This problem is directed toward obtaining better radio communications between fighter aircraft which assume various attitudes during combat. Some definite results have been obtained which will make for improved reception and transmission.
- 5. Differential Analyzer Problems. The theory and operation of the differential analyzer is being carried forward with a view toward making use of this machine in non-linear circuit investigations and other electrical research problems.
- 6. Frequency Stability of Phase-Shift Oscillators. A method of using the harmonic content in the output voltage of an oscillator to help hold the generated frequency constant has been devised and tested both theoretically and experimentally.
- 7. Electro-Mechanical Analogies. The usefulness of electro-mechanical analogies in transferring knowledge from one field to the other is being broadened and the technique involved in making quantitative analogies is being improved. Fundamental concepts and principles are given first consideration.
- 8. Considerations in Location of High-Frequency Receiving Antenna. The theoretical considerations involved in locating a small antenna, like a television-receiver antenna, so as to deliver the greatest signal output have been studied.
- 9. Gain Stability Through Negative Feedback conducted by G. F. Corcoran and G. E. Boggs. Superheterodyne radio receivers used in

instrumentation have been stabilized against variations in temperature and humidity.

- 10. Temperature Sensitivity Control of Transistor Circuits, The transistor is a relatively new amplifying (and oscillating) unit which will be of much greater value to industry when satisfactory temperature characteristics are developed. Ways and means of compensating for (or controlling) the extreme temperature sensitivity of transistors is being undertaken. No significant results have been obtained since the investigation is in its early stages.
- 11. Quartz-Crystal Resonator Control of a 100-kc Oscillator. Precise control of frequency standards is of considerable importance. Control within about one part in fifty million has been achieved; this work having been done jointly by the National Bureau of Standards and the University of Maryland.
- 12. Exploration of the Upper Frequency End of the Microwave Spectrum with Diode Produced Higher Harmonics. The practicality of generating and utilizing super harmonics in the upper frequency end of the microwave spectrum is being investigated. Frequencies in the order of 50,000 million cycles per second are involved in this project.
- 13. Determination of the Conditions for Maximum Recordable Oscilloscopic Writing Speed. The highest trace speed ever recorded was obtained during the course of this investigation, namely, 13,000 inches per microsecond. This tracing speed exceeds the velocity of light (12,000 inches per microsecond) and should be of considerable value to workers in the field of physical research. This project has received considerable attention in technical journals, national magazines, and newspapers.
- 14. Diode Multipliers Operating at High Frequencies. An investigation of the possibilities of improving the efficiency of Class-C amplifiers employing d-c feedback has been undertaken.
- 15. Reduction of Noise Figure in Intermediate-Frequency Amplifiers. The possibility of reducing the noise in the output of intermediate-frequency amplifiers by means of properly adjusted double-tuned circuits at the input shows considerable promise. This investigation is in its theoretical (or mathematical) stage of development at this time.
- 16. Dynamic Serial Circuitry. The main features of this kind of circuitry stem from the fact that it is designed to perform the logical switching functions necessary in high-speed digital computers of the serial type. Germanium diodes are employed to perform the logical switching functions and give somewhat higher repetition rates than have previously been obtained.
- 17. One-Source, Two-Tone Subcarrier Channel. An experimental analysis of a "one-source, two-tone" (or "frequency shift keying") subcarrier channel in terms of the energy spectrum has been made. The energy spectrum examination showed that sine-wave and square-wave drives of a typical modulator gave results that correlate excellently with the theoretical counterparts in frequency modulation.
- 18. Noise from the Plasma of a Gaseous Discharge. Equations for the available noise power spectra of the alternating-current discharge, the direct-current discharge with a transverse magnetic field, and the alternating-current discharge with a transverse magnetic field have been derived. The methods of derivation made use of correlation theory and the Wiener-Khintchine equation and it was found that a significant increase in available noise power is obtained by subjecting a plasma to a

transverse magnetic field. The magnitude of the observed increase was of the same order as that predicted from theoretical considerations.

- 19. Multiplication by Means of Autosyns or Synchros. The problem of automatic multiplication is a vital one and an approach to this problem was pursued using autosyns (or synchros) as electrodynamometers. Two such autosyns plus a third for error pick-up, combined with an error amplifier, were employed in an experimental model. The limitations of autosyns as a substitute for the present-day servomultiplier were investigated; the chief limitation being the ratio of stiction in the bearings to the maximum available torque obtainable from an autosyn.
- 20. Method for Making a Precision Pulsed Radar Self-Calibrating. A simple method for making a precision pulsed radar system self-calibrating has been developed. It yields the ratio of received power to transmitter power. A portion of the transmitted pulse is made to bounce back and forth in a long, short-circuited, microwave transmission line where it is delayed and attenuated. A portion of the bouncing pulse is fed into the receiver at regular intervals to calibrate its output in terms of the transmitter power. The analytical expressions required for an understanding of the system have been developed.
- 21. Effects of Surface Roughness on the Reflected Wave for Vertically Polarized Over-Water Propagation. Experimental tests were made to determine the effects of surface roughness on the magnitude of the earth-reflected wave for ground-to-air propagation over sea water. Recordings of signal strength were made in a suitably instrumented airplane which flew in a fixed course from the ground station at various altitudes. Simultaneous recordings were made of the height of the water waves. A roughness factor, defined as the ratio of the experimentally determined modulation factor to the theoretical smooth-surface modulation factor, was determined and plotted as a function of grazing angle. These data are important to communication and navigation systems.
- 22. Radio Communication Intelligibility. The purpose of this study was to devise means of improving the intelligibility performance of airborne communication systems. (Present-day systems employ clipping for this purpose.) Electronic circuits were designed and developed to provide for the use of pre-emphasis, compression, clipping, de-emphasis, and expansion. Overall system speech intelligibility characteristics were measured by the articulation test method. The system giving highest overall intelligibility contained all of the above circuits except demphasis. The intelligibility of this system was found to be approximately fifty per cent superior to that of the system using clipping only. It is hoped that these devices will be further developed and evaluated for inclusion in all future military airborne amplitude-modulated, radio-communication systems.
- 23. Receiver Output Variations with Input Impedance Changes. Microwave receiver output variations with changes in input impedances may be explained by variations in crystal-mixer characteristics. An empirical equation was developed for describing the output variations in a balanced mixer radio-meter as a function of the parameters in the radio-frequency circuit. It was found that these variations probably originated from the radio-frequency noise that is emitted by crystal mixers. A theoretical model based on this noise was developed and receiver output variations predicted by this model have fair agreement with the variations obtained from the empirical equation.



The Headquarters Building of the Glenn L. Martin College of Engineering and Aeronautical Eciences

24. Microwave Diffraction Patterns in the Apertures of Electromagnetic Horns. Experimental measurements of electric field intensity and phase fronts were made in the apertures of six pyramidal X-band horns. A probe suitable for aperture measurements in this band was developed.

25. A 300 M-C Noise Comparator. The apparatus for the accurate comparison of small noise voltages in the 300 M C region is described and a theoretical analysis for a desired obtainable sensitivity has been developed.

### **Publications**

1. Electrical Engineering Experiments, by H. R. Reed, T. C. G. Wag-

ner, and G. F. Corcoran, John Wiley and Sons, 1952.

2. Ultra High Frequency Propagation, by H. R. Reed and C. M. Russell, John Wiley and Sons, 1953.

3. Electronics, by G. F. Corcoran and H. W. Price. A book which is in the process of being published by John Wiley and Sons.

4. Servo Mechanism Practice, by W. R. Ahrendt. A book which is being published by the McGraw-Hill Book Company.

5. Basic Electrical Engineering, by G. F. Corcoran. 1953 revision of a textbook originally published by John Wiley and Sons in 1949.

6. Formulation Methods for Finite Systems, by H. M. Trent. A manuscript of a textbook which is being prepared for publication.

7. Methods of Solution of the System Stability Problem (Including

an Introduction to the Theory of Equations and the Complex Variable), by H. R. Reed. A manuscript of a textbook now used in photo-offset form and which is being revised for more permanent publication.

8. "Quantum Theory of a Damped Electrical Oscillator and Noise," by J. Weber, in *The Physical Review*, June, 1953.

9. "Waves in Electron Beams Having Space Charge Depression of Potential," by W. R. Beam. A Ph.D. thesis soon to be released for publication.

10. "Improvement in Gain Stability of the Superheterodyne Mixer Through the Application of Negative Feedback," by G. E. Boggs, Proceedings of the Institute of Radio Engineers, February, 1952.

11. "Quantum Theory of a Damped Electrical Oscillator and Noise, II," by J. Weber. Submitted for publication in *The Physical Review*.

12. "Vacuum Fluctuation Noise," by J. Weber. Submitted for publication in *The Physical Review*.

13. "Microwave Investigation of Free Electron Concentrations in Flames," by J. Weber in collaboration with Dr. K. E. Shuler, John Hopkins University Applied Physics Laboratory. Submitted for publication in the *Journal of Chemical Physics*.

14. "Scattering of Electromagnetic Waves by Wires and Plates," by J. Weber. To be submitted to the *Proceedings of the Institute of Radio Engineers*.

15. "Amplification of Microwave Radiation by Substances NOT in Thermal Equilibrium," by J. Weber. Published in the transactions of the Institute of Radio Engineers Professional Group on Electron Devices.

# F. DEPARTMENT OF MECHANICAL ENGINEERING

# AIRCRAFT STRUCTURES

Shear Log in Tensile Plates With Constrained Ends Under Symmetrical Loading

This project is designed to obtain information relative to the stress distribution in monocoque structures where shear lag is present. The problem of shear lag has been of considerable interest to aeronautical and structural engineers in structural problems related to the use of thin metal sheet panels as indirectly loaded members. The design data obtained should be of great value in the design of monocoque aircraft structures, and in the design of structures in general where shear lag is present.

# Creep of Riveted and Spot Welded Lap Joints at Elevated Temperatures

Tests of riveted and spot welded lap joints of high strength aluminum alloy and stainless steels to determine their creep strength in aircraft skin are being performed.

# CONDITION OF FILM

# A Study of the Application of a Mach-Zehnder Type Interferometer

The purpose of this study is to investigate the use of the interferometer in the field of heat transfer as a means of analyzing film conditions by optical methods. In addition the possible use of the interferometer in media other than air or single gases is being investigated.

# PARACHUTE DESIGN

# Air Permeability of Open Weave Fabrics

The air permeability of open weave fabrics is of particular importance in the design of parachutes for either personnel or cargo. The dynamic stability of a parachute canopy, the magnitude of the parachute opening shock, and the reliability of canopy inflation depend to a considerable degree on the canopy fabric permeability. Tests of 17 fabrics in 5 weave patterns were made over a differential pressure range of 1 to 15 psi, and empirical equations were derived for predicting the permeability as a function of the differential pressure and area ratio.

# PROPERTIES OF VAPORIZING FLOW

# An Apparatus for Investigating the Characteristics of Vaporizing Flow in a Capillary Tube

An apparatus was designed and perfected for the purpose of investigating the characteristics of vaporizing flow in a capillary tube. Preliminary investigations indicate that characteristic types of flow can be detected.

# RADIO ANTENNA

# The Deflections of a Gear Drive for a High-Performance Radio Antenna Mount

This study was concerned with designing a gear drive of the radio antenna mount to comply with very exacting specifications with respect to lost motion, friction and compliance. A radio antenna mount is now being constructed using the design perfected in this investigation.

# STRESS, BALANCE, AND VIBRATION

# Vibrations of a Two Span Beam with an Elastic Mid-Support Under the Action of a Uniformly Moving Load

Experimental apparatus was built to facilitate a mathematical analysis of the vibrations and stresses induced by moving loads. These results can be of use in railroad bridge design where rolling stock causes vibrations.

# The Dynamic Response of a Two Component Balance to an Arbitrary Periodic Force and Moment on a Towed Body

The differential equations of motion for a towed body proceeding at uniform speed in a straight line, supported on a two component balance, and subjected to an arbitrary force and moment were derived and solved. The distortion of the quantities on such a balance were measured and the practical uses determined.

# An Investigation of Damages Resulting from Laboratory Vibration and High-Impact Shock Tests

Two-hundred and seventy pieces of equipment were subjected to Navy vibration and high-impact shock tests. The resulting damage was described and analyzed, and methods to eliminate damage are suggested to serve as a guide for future design.

# Transverse Vibration of a Tube Containing Flowing Fluid

The free transverse vibrations for the fundamental mode of a single span tube containing a flowing fluid were investigated analytically and experimentally. An approximate solution of the differential equation of motion was made with an infinite power series. This study indicates the reasons for the incorrect conclusions propounded by previous investigators.

# SWITCH DESIGN

# The Design and Testing of Hermetically Sealed Miniature Switches

This investigation was prompted by the discovery that no satisfactory hermetically sealed miniature switch was being manufactured for application in a specific defense unit. The design of two switches were completed and built, and are now undergoing environmental and qualification tests.

# THERMAL PROPERTIES

# The Thermal Conductance of Plane Air Spaces

A study is in progress of the rate at which heat is conducted through various types of plane air spaces typical of those found in ordinary dwelling construction. Thermal conductance factors have been measured for several sizes and orientations of plane air spaces. These results can be utilized in heating and air conditioning design calculations.

# Analysis of Coolant and Metal Surface Temperature in a Simplified Nuclear Reactor

This study was concerned with the removal of heat from a hypothetical reactor. The theoretical procedure in which the coolant velocity and coolant properties affected the temperatures in a nuclear reactor was studied.

### Publications

Engineering Mechanics, C. R. Hayleck and John E. Younger, a text-book in preparation.

Aircraft Pneumatics, John W. Jackson, a textbook in preparation.

Mechanical Vibrations, Ralph H. Long, a textbook in preparation.

"Transverse Vibration of a Tube Containing a Flowing Fluid," Ralph H. Long, to be published by the *Journal of Applied Mechanics*.

"Vibration of a Two Span Beam with Elastic Mid-Support. Under the Action of a Uniformly-Moving Load," Irving H. Shames, paper being prepared for the American Society of Mechanical Engineers.

Advanced Dynamics, John E. Younger. A completed textbook now being checked for publication.



# XIII. College of Home Economics

### NUTRITION

# The Utilization of Protein by Normal College Women

The purpose of this investigation is to determine the utilization of proteins from an adequate, palatable, and controlled diet by healthy college women under varying experimental conditions using (a) fish, and (b) meat, as the main dietary protein. This study is designed to compare the utilization of beef protein with fish protein when the usual combination of foods and meals of the American public is included, and should answer a number of questions related to the nutriture of a number of groups, especially those in the lower income brackets. To date, results indicate that the protein and iron of fish can be as efficiently utilized as the protein of meat. Caloric determination of the diet and statistical evaluation of the results are now in progress.

# Work in Progress

Community Meals, Pela Braucher.

Physiological Factors of Human Subjects in Relation to Metabolic Experiments, Pela Braucher.

Effects of Holding on the Composition of Food Samples of Metabolic Experiments, Pela Braucher.

### **Publications**

"New View of AHEA Headquarters," Marie Mount. Journal of Home Economics, Volume 44, No. 8.

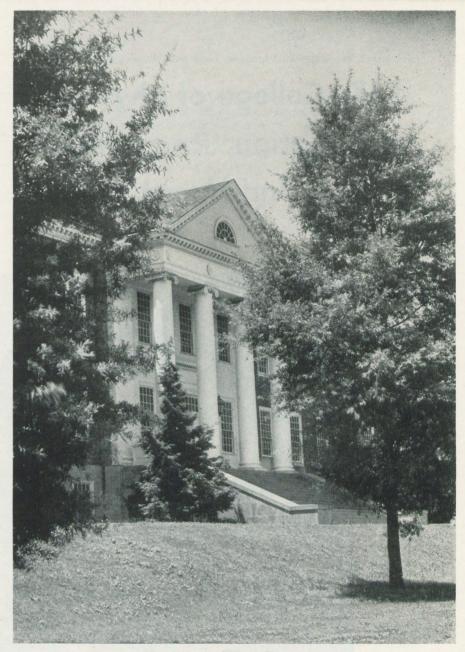
"Frozen Fillets go to College," Pela Braucher. 1953 Fisheries Yearbook.

"Ocean Tests Materials," Fremont Davis. Chemistry, Volume 26, No. 2.

"It's New—It's Such an Easy Way to Make a Dress," Eileen Heagney. Butterick Pattern Book—1952-53, Butterick Company, Inc., New York.

"Pattern Alterations," Eileen Heagney. Butterick Pattern Book—1952-53, Butterick Company, Inc., New York.

Butterick New Sewing Book. Eileen Heagney. Butterick Company, Inc., New York.



The College of Home Economics

# IX. College of Physical Education, Recreation and Health

# PHYSICAL ATTRIBUTES AND PERFORMANCE

Motor Ability Factors Related to the Ability to Play the Various Positions in Football

The purpose of this investigation is to determine what physical abilities a person must possess to be successful in playing football. The differences in motor ability of successful players as compared with relatively unsuccessful players, and the motor ability factors that are most important to specific team positions has been studied. The results are now being correlated.



Research in Kinesiology, a study of human motion and reactions thereto

# The Effect of Weight Training on the Flexibility of Body Joints

Two groups of college students were used to measure the range of motion in seven joints of the body before and after training. Measurements of girth and strength were also taken. One group exercised systematically by lifting weights over a six month period, while the other group did not participate. Tentative conclusions indicate that flexibility is not affected by weight training. These results are of great significance to those interested in using heavy resistance for purposes of conditioning the body.

# The Relationships Between Several Selected Measures of Agility and Power

Using the scores made by women physical education professional students during the past three years, the relationship between agility and power were studied statistically. The results indicate that a relationship exists, but not with any great statistical significance.

# PHYSICAL PERFORMANCE

# Comparison of Effects of Certain Blood Alkalizers and Glucose Upon Competitive Endurance Performance

This investigation tested the effectiveness of the so-called "superfoods" on the competitive performance of athletes. The most commonly used of these, a sugar, certain blood alkalizers, and a combination of sugar and alkalizers were administered to a champion team of cross-country runners during the course of an entire season of competition. The results showed that the team's performance was not influenced by any of the "super-foods".

# Emotional Reactions of College Athletes as Measured by Certain Cardiovascular Measures

The members of the University varsity basketball team were studied during a complete season of play. The extent of emotional excitation was correlated with quality of performance in play. Results indicate that high pre-game excitation tended to be followed by superior team play.

# The Effects of Continual Distance Running Over a Period of Six Weeks on Certain Circulatory Measures

Two groups of students were used to study the effect of running on the changes in the circulatory mechanism. One group would run for six weeks while the other exercised as little as possible. This procedure was then reversed with the running group becoming sedentary and vice versa for the next six weeks. The following measurements were taken over the twelve week period: sitting pulse rate, sitting blood pressure, sitting brachial sphygmograms and pulse rate recovery after three minutes of stepping on and off an 18 inch bench.

# A Study of the Relationship Between General Endurance and Swimming Endurance

A chair-stepping test of endurance was administered using a group of college women, professional and non-professional students. Each student was then given a swimming endurance test. It was found there was a definite relationship between general endurance and swimming endurance, but it was not high. Apparently the degree of swimming skill has a strong effect on the swimmers endurance.

# PHYSICAL TRAINING AND ACADEMIC ACHIEVEMENT

# The Effect of an Interpolated Physical Education Program Upon Academic Efficiency

A procedure was designed whereby fourth grade pupils were tested as to their performance in an academic task before and after a period of physical education activities. A control group received identical tests but was not provided with the activity period. It was found that the group which had the activities consistently performed better in the academic tasks than the control groups, except when they were not permitted a "cooling off" period before their second test.

# PROCEDURES AND TECHNIQUES IN PHYSICAL EDUCATION

# Job Analysis in Health, Physical Education and Recreation

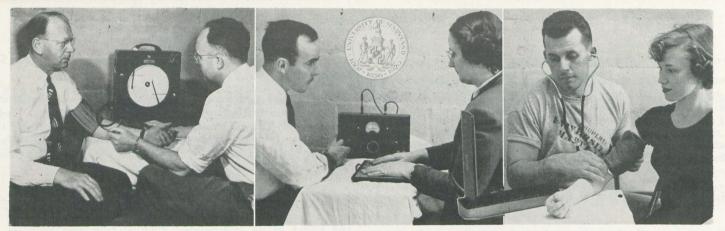
This investigation involves a review of the areas of Health, Physical Education and Recreation, using job analysis technique. It is intended for use as a guide for those desiring to apply this method of analysis to these areas.

# Student Evaluation of Professional Preparation in Physical Education

This investigation is designed to give the student an opportunity to evaluate his professional education with respect to the functions he will be expected to perform in the field. Functions of physical education practitioners are being determined by review of the literature, logs and diaries, and interviews with individuals in the field. The results of this study can provide one means of curriculum evaluation and revision.

# An Analysis of the Mechanical Characteristics of the Sphygmograms Recorded with the Cameron Heartometer

The Cameron Heartometer which records blood pressure and arterial pulsations (syphygmograms) was tested in various ways with different mechanical devices. The results indicate that the instrument cannot be used for measuring changes in arterial pulsations resulting from exercise with the accuracy desired.



Left: Dean L. M. Fraley has his pulse wave measured by Dr. Ben Massey, "cardiovascular condition specialist. Center: The "psychogalvanometer" is a lie detector-like device used for studying the emotional upset of athletes. Dr. Warren R. Johnson demonstrates its use to Dr. Ellen Harvey. Right: The women share enthusiasm for research projects which "validate" physical education activities. Bill Foland, instructor, checks the blood pressure of Eleanor Cane, physical education major.

# The Effect of Posture on the Brachial Sphygmogram as an Indication of Circulatory Fitness

The purpose of this investigation was to determine the veracity of the reports of the University of Illinois Physical Fitness Research Laboratory that brachial syphymograms recorded with the individual in the sitting position will differentiate those having good circulatory conditions from those in relatively poor condition. In addition tests were made to determine if records taken in the lying position or standing position, or changes of records due to postural change would serve better as indicators. The findings of this report substantiate the Illinois reports. Posture was found to markedly influence the contour of the waves, but not to improve their value as indicators of the type of circulatory fitness associated with endurance exercise.

# A Revision of the Sport Skill Tests for Women in Professional and Non-Professional Classes

After three years, using subjective analysis and test scores, skill tests for archery, badminton, basketball, soccer, speedball, hockey, softball, tennis, and volleyball were revised and improved. In addition, achievement scales were constructed for these tests for professional and non-professional classes, based on the scores made during the past three years. These achievement scales are in the form of T-scales and have been completed for several of the sports and are in process of construction for the others.

# Analysis of Written Examinations in the Required Physical Education Orientation Course for Women at the University

These examinations are being analyzed to determine which questions are suitable for re-use from the point of view of difficulty and discrimination between poor and good students, and from subjective judgments of faculty and students.

# Development of Standardized Achievement Scales for Physical Fitness Tests at the University

The scores made by women professional students during the past four years were used to construct T-scales (achievement scales) for the ten tests that are being used.

# Development of Standardized Achievement Scales for Numerous Sports

Skill tests are being given to professional and non-professional women students in physical education to construct T-scales.

# Revision of a Widely Used Volleyball Skill Test

Data are being gathered from women's professional and non-professional physical education classes to revise a widely used test for volleyball skill.

# **Publications**

Principles and Techniques of Supervision in Physical Education, James H. Humphrey and Dr. Leslie Irwin. (In press with C. V. Mosby Publishing Company.)

"Functional Analysis and the Training of Physical Education Teachers", James A. Humphrey. Scheduled for publication in the September 1953 issue of the *Journal of Teacher Education*.

"The Relative Importance of the Functions Performed by the Coach and Physical Education Director in the Small High School". James A. Humphrey. Accepted for publication in the Journal of the American Association for Health, Physical Education and Health.

Successful Wrestling, Warren R. Johnson and Arnold W. Umbach. C. V. Mosby Company, 1953.

"Opportunities for Psychological Research in Physical Education", W. R. Johnson. *The Physical Educator*, 1953.

In Preparation for publication in 1954.

Readings in Physical Education and Sports, L. M. Fraley, W. R. Johnson, B. H. Massey. To be published by Prentiss Hall, Inc., in 1954.

# X. Agricultural Experiment Station

# A. AGRICULTURAL ECONOMICS AND MARKETING

# TAXATION AND FINANCE

# Rural School Bus Problems Studied in Several Counties

In the four counties studied considerable back-tracking and overlapping characterized the school bus routes. Results indicate that about one-third of the bus mileage traveled is actually on the road segments where pupils live or assemble; another one-third of the mileage is without pupils and the other third comprises back-tracking. In locating school plants in rural areas in the future the advantages of an optimum sized school must be balanced against the disadvantages of long school bus routes.

# Various Phases of Rural Fire Problems Studied

A survey of farms in north-central Maryland indicates that substantial improvements with respect to fire prevention can still be made by fire-proofing roofs, proper chimney construction, and properly installed lightning rods. The survey also showed that one-third of the farmers could reduce fire hazards by adding such protective facilities as improved farm lanes, an adequate water supply, and access to a telephone.

# Studies Show Farmers' Tax Obligations Have Expanded in Recent Years

Shifts in the emphasis of state taxing measures have held farm real estate taxes down, but have increased farmers' tax liability in other forms. Between 1940 and 1951 farmers' real estate taxes per acre increased from \$.73 to \$1.02, but the highway-users tax approximately doubled. In so far as impact and liability is concerned the evidence points to a fair balance of the major taxes between farm and non-farm groups in Maryland. The farmers tax liability in 1951-52 because of property taxes, highway-user taxes, and sales taxes was about \$1.10 per capita greater than it was for non-farmers.

# LAND ECONOMICS

# Types of Farming Areas Undergo Constant Change

Through the years farmers have tried many combinations of enterprises in an attempt to utilize their land resources most effectively with respect to the market demands. There are twelve type-of-farming areas in Maryland, of which the tobacco area is most distinct. During the last two decades a shift to broiler production and away from vegetable crop production on the Lower Eastern Shore has resulted in a greater emphasis on the growth of grains and soybeans. These shifts in types-of-farming emphasizes the need for continuous farm management research as a basis for extension education.

# Farm Drainage Problems Apply to Many Eastern Shore Farms

The installation of drainage on Eastern Shore farms resulted in many beneficial improvements. Such operations as plowing, planting, cultivating, and harvesting could be done from 7 to 14 days earlier after installation of a drainage system. Drainage was also accompanied by increased crop yields. However, a complete system of drainage had to be installed in order to obtain maximum yields. The study indicates that the benefits from drainage are not fully obtained unless there is complete drainage installation on individual farms or groups of farms, and adequate maintenance of these facilities.

# PRICES

# Cost-Price Squeeze Develops

As a result of falling prices and rigid costs Maryland farmers have been caught in a cost-price squeeze. This trend began prior to the Korean War, which arrested it temporarily, but it has become acute in recent months. A study is in progress to determine the prices paid by Maryland farmers for supplies in relation to prices received by farmers for products sold. This would indicate the specific cost-price relationships for Maryland farmers.

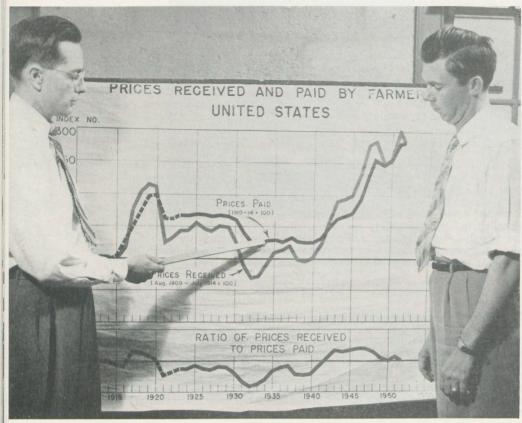
### MARKETING

# Retailers in Baltimore and Frederick Benefit from Poultry Merchandising Schools

A total of 53 retailers, representing a cross section of chain and independent stores, in Baltimore and Frederick sent trainees to poultry merchandising schools. Of the number that attended, 26 retailers made changes in their handling practices, which resulted in an increase in the volume of poultry sales over those of the groups that did not attend and those that attended but did not make changes.

# Price-Quality Relationship of Maryland Canned Vegetables Comparable With That of Similar Items from Major Competing Areas

A survey of 37 food brokers in 18 cities in 8 states and of 37 wholesale grocers in 36 cities in 16 states indicates general trade acceptance of Maryland canned vegetables. Fifty-one per cent of all brokers said Tri-State (Maryland, Delaware, and New Jersey) canned vegetables sell at prices comparable with similar items from other major supply areas, and 43% said prices were lower. Fifty-four per cent of the brokers rated Tri-State items as good or better in quality than similar items from competing areas.



Dr. Harold D. Smith and James Horne studying farm prices

# Tests Show Cold-Wall Tanks Saving Labor and Milk for Maryland Dairy Farmers

A survey of 59 fluid milk producers, supplying the Washington market who had cold-wall tanks indicated that this new type of equipment is effectively saving labor and milk. Laborers on these dairy farms prefer cold-wall tanks over the old system of shipping milk in 10 gallon cans, and thus far little difficulty has been encountered with off odors or flavors.

# Broiler Records Show Trend Toward Greater Production Efficiency

Broiler records in the Delmarva area for the years 1947 through 1952 show that producers are now growing a heavier bird in less time and with less feed than was possible six years ago. This saving is due to better feeds, improved breeding, and better management practices, and it has resulted in a lower cost of production.

# Low Bid Rejections Pay Maryland Tobacco Growers

In a study of the marketing of Maryland tobacco, 349 baskets were followed to their ultimate buyers after farmers had rejected the first bids. Slightly over 80% of these baskets were sold at higher prices than

the rejected bids. Twelve per cent were sold at the same price, and  $7\frac{1}{2}\%$  were sold at a lower price. The net increase in value per basket for the entire lot was \$12. Thus, Maryland farmers increased their returns from tobacco by rejecting bids on baskets which appeared to be worth a higher price.

# B. AGRICULTURAL EDUCATION AND RURAL LIFE

# Possibilities of Systematic Education for Young and Adult Farmers Studied

To date only a limited number of vocational agricultural education adult classes have been given in Maryland. Studies in Clarksville, Howard County and the Southern High School area, Anne Arundel County indicate that more than 90% of the teachers of vocational agriculture felt that such classes would enhance the standing of the field in their community, and half of them expressed an intense interest in starting them. More than 70% of the farmers in these communities indicated that they would be interested in attending adult classes if they were organized. If adult classes in agriculture are started the interest expressed by school personnel and farmers should insure their success.

# C. AGRICULTURAL ENGINEERING

# Self-Propelled Tobacco Spearing Machine Tested in the Field

The 1952-53 season marked the first field test of the tobacco spearing machine operating as a self-propelled unit. Highly satisfactory results were obtained and necessary changes are being made to improve the operation of the machine.

# Tobacco Curing With Forced Air and Supplemental Heat Tested

Tests were continued during the season on the use of supplemental heat and forced air to control curing of tobacco during high humidity weather. Very satisfactory curing conditions were obtained from the use of oil burners and a fan to force heated air through the tobacco. If the temperature is kept below 100°F very good curing can be obtained. However, with barns of loose construction it may be necessary to increase the heating capacity beyond the 21,000-30,000 BTU per 1000 tobacco plants used as the maximum heat capacity of the various units tested.

# Use of Heated Air for Hay Drying Studied

The hay drying survey of mow curing systems was continued so that the various heat units in use could be studied. It was found that baled hay was dryed mostly by the use of heated air hay dryers. The use of heat accelerates the drying process from 20-50% depending on initial moisture content, type of hay, and amount of heat used. However, heat also speeds the rate of mold growth so that a minimum of 30 cubic feet per minute of air per square foot of floor area is recommended insteal of the 25 CFM per sq. ft. normally used in the design of natural air dryers for baled hay.

# Ear Corn Drying With Unheated Air

It was found that intermittent blower operation controlled by humidistat again provided faster drying than continuous operation, and resulted in a saving of about 50% of the electricity used.

# Labor Saving Devices for Tomato Harvest Being Perfected

To overcome the difficulties of labor shortages a mechanical device consisting of a belt conveyor mounted on wheels was designed to make better use of the available labor force. Pickers walked behind the conveyor picking the tomatoes and placing them on the belt. The tomatoes were then mechanically placed in baskets, and the baskets placed on the ground for truck pick-up at ten row intervals. Experiments demonstrated the feasibility of proceeding with such a unit, and making the changes necessary to improve its economy and practicability.

# D. AGRONOMY

# PASTURE AND HAY CROPS

# The Effect of Various Pasture Mixtures on Beef Production

An important part of the search for better pasture and forage crops is the study to determine the pounds of beef per acre that can be obtained from various pasture mixtures. After four years of study of five pasture mixtures it was found that the tall fescue-Ladino clover and the orchard grass-Ladino clover mixtures produced the most by matter and beef per acre. New pasture studies have been started to determine ways in which pure stands of Korean lespedeza, common pearl millet, and sweet sudan grass can be utilized to increase the gains during the summer period.

# Studies Show Pasture Renovation is Practical

The best methods of renovating pastures have been concluded after six years of research. Results indicate that when new seedings are to be made in late summer or early fall, disking established sods are a better practice than shallow plowing in preparing the seed bed. This is the reverse of the findings that apply to seedings that are made in the spring when shallow plowing proved superior to disking. Regardless of time or method of use, among the several mixtures tested orchard grass and tall fescue, in combination with Ladino clover, red clover, and alfalfa, proved to be the most productive throughout the test.

# Promising Forage Varieties Tested

Last year tests were made of promising forage varieties for the State. This is an important contribution to volume seed production of forage varieties that result in better yields on pasture and hay lands. Tests indicate that southern varieties of smooth bromegrass are more productive than northern varieties, commercial and Early Synthetic were the high yielding orchard grasses, and Williamsburg was the highest producing alfalfa.

# Further Study Being Made of the Effect of Climate on Plant Growth

The particular climatic conditions that are associated with growing forage crops have an important effect on the way in which stands of these crops are maintained, and how well they produce. In reducing heaving damage to plant during freezing and thawing the uniformity of forage cover over the soil has been found to be more significant than the amount of forage. Frequent freezing and thawing causes more damage than long cold periods when the soil remains frozen.

# State-Wide Tests Made on Forage Strains and Varieties

A number of tests are in progress in the various areas of the State to determine the varieties and strains that will be most productive under the varying soil and climatic conditions.

# Initial Phases of Red Clover Improvement Completed

The best Maryland strains and the highest yielding varieties of red clover from other states are being used to develop better resistance to southern anthracnose. This disease causes much loss in red clover grown in the State.

### Search Continues for Better Ladino Clover

A breeding program is in progress using 21 parent clones of the Beltsville strain to determine the Ladino clover strains that will be productive, long-lived, and will grow in combination with productive grasses.

# Selecting Better Orchard Grass Strains

Trials are under way to determine the yielding ability and other important characteristics of 89 orchard grass clones that have been selected during the last several years.

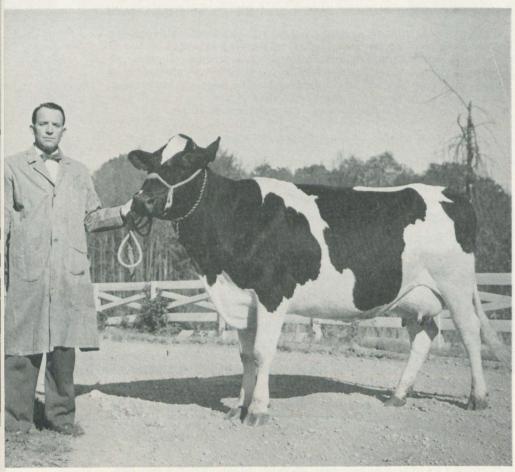
# SOILS

# Better Understanding of Phosphorus and Potash Needs for Alfalfa Under Study

Studies using phosphorous and potash in conjunction with plant tissues are resulting in greater insight into the use of fertilizers and will affect future recommendations for maximum alfalfa production.

# Effects of Soil Conditioners on Crop Yields in Progress

Studies are being continued to determine the effect of soil structure on crop yields. The use of soil conditioners in the past year has resulted in increases of approximately 11% in field corn, 17% in sweet corn, 17% in oats, with no effect on soybean yields. Soil conditioners have limited practical value for general use because of their expense, but they have proven very valuable in helping to understand the effects of soil physical conditions on crop productivity.



Dr. J. C. Shaw with a cow after recovery from Ketosis

# Soil Tests Being Developed to Measure Phosphorus Availability to Plants

Work is in progress to analyze both the soils and tissue of plants to learn more about the availability of phosphorous when applied at diferent rates on various soil types.

# Fertilizer Studies on White Potatoes in Progress

Tests are continuing for a fourth year to determine the response of white potatoes to various applications of fertilizers, and to ascertain what yields can be expected under various seasonal conditions.

# Various Phosphorus Carriers Compared for Phosphate Availability

The effects of various phosphorous carriers on wheat and corn yields has been under study for the past nine years. The studies indicate that fused rock phosphate plus gypsum give the best results.

# Agronomists Aid in Studies of Moisture and Soil

Studies are continuing to ascertain the effects of various land use practices on peak rates and total accumulated water run-off from water sheds. Run-off data using various terraces, waterways, dams, and cropping systems are being studied to relate erosion control practices to individual farm situations.

# GRAIN CROPS

# Field Corn Hybrids Continue to Perform Well

Continuing field evaluations of new hybrids were made at different locations in the State. These tests keep Maryland farmers abreast of continuing improvements in corn hybrids.

# Sweet Corn Hybrids Tested

Last year fifty-two sweet corn hybrids were compared to determine the most productive hybrids of good quality. The results are published in the bulletin entitled, "Sweet Corn Trials of 1952."

# Varieties of Small Grains are Compared

Wheat: Comparative performance records were obtained in six regional field tests for the most promising wheat varieties for the Middle Atlantic area.

Barley: A testing program for barley improvement indicates that Wong is the best variety for use in Maryland. Research is continuing to compare the productivity of the latest varieties with the Wong variety.

Rye: A new variety of rye from Germany, known as Laube's cover crop rye, is being compared with the widely used variety of Abruzzi at the experiment farm.

# Determine a Practical Method of Controlling Garlic in Small Grain

Studies are continuing to determine the rates and time of application of 2, 4-D to minimize the injury to small grain, and still effectively control wild garlic. The results to date indicate that the best time for spraying is in the very early spring, about the time the small grain growth begins.

# Soybean Testing Program Enlarged

For the past year tests of various soybean varieties have been conducted in the principal soybean growing areas of the Eastern Shore. As a result of these studies a list of recommended varieties has been distributed.

### TOBACCOS

# New Ways Found to Increase Tobacco Yields

Tests in progress at the Tobacco Experimental Farm indicate that farmers can reduce acreage and improve yields without sacrificing quality. The number of plants were increased from 5,000 to 7,500 per acre, and the larger population of plants resulted in an increased yield of 300 pounds per acre. The fertilizer rate was increased from 750 to 1,500 pounds per acre and resulted in an increased yield of 230 pounds of crop. Broadcasting proved a better method of applying fertilizer than either bands or row treatment.

# Quality and Yield of Maryland Strains Studied

A series of tests were conducted over a three year period to determine the yield of established strains of Maryland tobacco. The cured crops were graded and the market value determined. The results indicate that three broadleafed types, Posey, Wilson, and Keller, are grouped to yield about 1,300 pounds per acre when grown under disease free conditions; but they are not disease resistant. The Catterton variety, which is resistant to black root rot, gave 88% of the yield and 90% of the value of the three broadleafed types.

# Methyl Bromide Finds Wide Use as an Effective Soil Fumigant

In the past season there was a much wider acceptance of methyl bromide for fumigation for weed and disease control in tobacco seedbeds. This method resulted in a reduction in weed population in tobacco seedbeds, a saving in time required for weeding, a decrease in mosaic on plants, and increased vigor of the tobacco plants.

### WEED CONTROL

# Chickweed Control in Fall Seeded Alfalfa Under Further Study

Chickweed continues to be a major problem in alfalfa growth in Maryland. In addition to the use of chemical herbicides for weed control in alfalfa, a new phase of work is under study to determine the effect of various seed and fertilizer placement methods on the rapidity with which alfalfa strands are established, and the relationship of this establishment to weed competition.

# Calcium Cyanamid and 2,4-D Weed Control Studies in Corn Continued

Tests were conducted during the past growing season to compare the use of 2,4-D and calcium cyanamid with cultivation for the control of weeds in field corn. These tests show that 2,4-D is an effective preemergence treatment that will control broadleaf weeds effectively and will also reduce the competition from many weed grasses.

### SEED INSPECTION

During the spring of 1953 retail seed distribution points throughout the State were visited and approximately 360 samples were collected for testing. A laboratory analysis of these samples is being completed and a summary of the accuracy of seed labeling by various organizations will be prepared.

In addition farmers and seedmen submitted 2,775 seed samples for examination, and 477 samples of tobacco were cleaned and germination tests completed.

# E. ANIMAL HUSBANDRY

# BEEF CATTLE

# New Method for Earlier Evaluation of Rate of Gain in Beef Calves in Progress

For the past four years investigations have been made relative to the feeding of beef cattle calves. The first phase of the project, that of establishing sound feeding and management practices, has been completed. The second phase, that of testing the degree of inheritance of rate and efficiency of gain, has been initiated.

# Importance of Muscle in Carcass Studies

Further analysis has been done with the data secured from representative steers that are marketed. To determine the weight of cuts twenty different measurements were taken on live animals and correlated with two different sets of wholesale cuts. Results indicate that measurements of the depths of body, circumferences of body, and lengths of body had little if any use for forecasting the weight of cuts. The best method of estimating the weight of cuts is to determine the width of shoulders and depth of trust.

# Bloat Research Being Continued

The problem of bloat and the death caused by this condition is becoming increasingly serious to beef producers. To overcome bloating experiments with steers were conducted using a detergent to ascertain if relief ensues. As yet, the findings are inconclusive, and additional work is in progress.

# Nutrition Studies in Sheep Initiated

Pregnancy disease in ewes in many ways appears to be similar to ketosis in dairy cattle, and causes considerable loss to sheep raisers. The effects of sodium propionate on pregnant and lactating ewes and young lambs are under study. Insufficient evidence exists to reach any conclusion as to the effectiveness of sodium proprionate on the performance of ewes and lambs.

# SWINE

# Testing of Meat Type Pigs Continues

Litter size, weaning weights, rate of gain, and feed requirements are being gathered on Maryland Number One swine. Results to date indicate satisfactory performance of this type of swine.



Gauging the growth factor in 5-week old New Hampshire Cockrill

# F. ANIMAL PATHOLOGY

# Tests Continued on Vaccine Control of Brucellosis in Cattle

Further study of vaccination as a control measure for brucellosis indicates, at least experimentally, that Bang's disease-free herds can be established primarily through the expedient of vaccination. The resistance of herds appears to be maintained by revaccination with booster doses of vaccine at yearly intervals.

# Anaplasmosis of Cattle Under Study

Anaplasmosis is an infectious febrile disease that causes severe anemia and jaundice, and constitutes one of the major disease problems of the cattle industry. To alleviate this problem the complement fixation test for detection of carrier animals is presently being studied.

# Drugs Tested for Blackhead Control in Turkeys and Chickens

Indiscriminate use of drugs to control blackhead in turkeys and chickens should be avoided. Current investigations have shown many of treatments to be valueless. Tests indicate that enheptin, when administered properly, is one of the few economical and effective forms of treatment.

### Search Continues for Newcastle Disease Vaccine

This years studies are centered on changing the virus by growing it in living tissue cells rather than in living animals. There is evidence of changes in the disease producing properties of these cells to indicate a satisfactory modification may be reached after continued cultivation.

### Basic Research Continued on Ruminant Metabolism and Ketosis

Fundamental research is in progress on the metabolism of cattle, sheep, and goats. It has become clear that ruminants differ markedly from the common laboratory animals. Studies on ruminants must be greatly increased in order to develop adequate nutritional standards and to understand the changes occurring in the disease.

### Tests Show Infectuous Bovine Mastitis Can Be Controlled

To further a program of control a number of herds that have experienced serious outbreaks of mastitis are being treated with suitable drugs. Clinical disturbances have almost entirely disappeared, milk production has appreciably been raised, and the bacteria count considerably lowered.

# G. BOTANY

# PLANT BREEDING

# Plant "Twins" Aid Plant Breeding Research

Recently it was discovered that the X-raying of pollen greatly increased the number of twins and triplets in the resulting seeds of corn and the regal lily. To further plant breeding intensive investigation is being made of the induction of twins and haploids by means of X-ray treatment.

# Lilies and the Blood Lily Under Study for Plant Breeding Information

Studies are in progress concerning hybridization of native lily species. Methods are being developed to obtain rapid increases of valuable lines of the Easter lily. It has been observed that a rapid increase can be obtained from small bulbs produced by stem cuttings, and that by treating the stem cuttings with root inducing hormones a significant increase in the number of small bulbs was produced.

# The Growth of Unicellular Algae in Mass Culture Studied

Extensive experiments are in progress in the development of algae as contributors to the supply of organic material and food for human consumption, and to determine the factors that limit growth in such cultures. To date the main effort has been to establish a chemical environment which would provide for maximum continuous harvest. Detailed analyses have been valuable in showing the rates of nutrient removal from culture media. This information will permit renewal of essential nutrients as fast as they are lost, and will allow for a constant chemical environment for growth.

# PLANT PHYSIOLOGY

# Increased Movement of Growth-Modifying Substances Aided by Application of Boron

Experiments have demonstrated that boron causes a marked increase in the entrance and movement of applied plant growth-modifying substances, presumably through the stimulatory effect of boron on the movement of sugar. This discovery has important ramifications in the field of plant hormones, and several are currently under study.

# Leaf Analysis Used as a Guide to the Mineral Nutrition of Plants

Continued comparisons between the composition of plants and their ultimate yields suggest the possibility of determining "sufficiency values" for the various essential elements in plant growth in the future. Evidence indicates that the balance among the various inorganic constituents in plants is of comparative little importance. Similar yields occur with wide variations in the proportions of the various elements, as long as each of the essential elements are present at the "sufficiency level" or above.

# PLANT DISEASES

# Studies Continue on Identification and Control of Plant Virus Diseases

Virus diseases are of common occurrence in Maryland crops and are of special importance in the growth of peaches, potatoes, strawberries, tobacco, and tomatoes. Studies are in progress to determine the methods of spread of virus diseases so that control measures may be developed.

# The Possible Use of Actidione (Cycloheximide) in Culture of Plant Pathogenic Bacteria Investigated

Research designed to develop a material giving selective suppression of fungus growth with little or no effect on bacteria is in progress. This information will be of great value in isolation and culture of plant pathogenic bacteria.

# Disease-Resistant Varieties of Tobacco Developed

An intensive breeding program in progress during the past three years has resulted in the development of a number of tobacco hybrids that are resistant to black root rot, wildfire, and mosaic. Several of these plants approximate the quality of standard types of tobacco.

# Search Continues for Disease-Resistant Potatoes

Disease of potatoes cause serious losses each year and necessitates the search for resistant varieties adaptable to Maryland conditions.

# Field and Laboratory Tests of Fungicides Continued

The principal diseases present in the tomato spray plots at Salisbury were early blight and gray leaf spot. Research is in progress to gain a better understanding of the function of fungicides.

# Adaptability of Control Practices to Commercial Production of Sweet Potatoes Studied

Studies are continuing on the possible use of antagonistic organisms for control of fungi causing disease in sweet potatoes. It has been found that various soil organisms can prevent the growth in culture of the fungus that causes black rot in sweet potatoes.

# Developing Varieties of Strawberries Resistant to the Red Stele Disease

Samples of soil from diseased strawberry plantings were studied to ascertain the nature of the occurrence of races of red stele fungus. A series of resistant and susceptible plants were placed in various soils, and by their reaction to the red stele disease it was possible to determine which race was present.

# Investigation of the Pathogenic Organism Involved in the Wilt of Carnations in Progress

The specific purpose of this project is to study various means of main-

bacteria under anaerobic conditions. These studies may lead to better methods of establishing the value of various feeds, and pave the way for an understanding of how to feed the rumen bacteria and thereby do a better job of feeding the cow.

# Further Studies of the Chromogen Method for Measuring Digestibility

No single chromogen (colored pigment) was found that could be utilized as a digestion trial marker. The total pigment present offered the best possibility for marker studies and will be used for establishing more rapid methods for determining the digestibility of feeds.

# Use of Radioactive Tracer Substances Shows Beta-Hydroxybutyric Acid is Converted into Milk Fat

Using the artificial heart-lung perfusion apparatus, beta-hydroxybutyric acid was added to blood and pumped through an udder removed from a cow immediately after slaughter. This resulted in betahydroxybutyric acid being synthesized into milk fat and possibly other milk substances.

# DAIRY TECHNOLOGY

# Chemical Changes in Milk Fat Related to Flavor in Dairy Products

Off-flavor problems due to the oxidative deterioration of milk fat during processing and storage is a major problem in the dairy industry. The role of copper as a catalyst in the development of oxidized flavor has been studied by adding a copper binding to milk. The results indicate that ionic copper is probably not the active catalyst in the process.

# Methods Developed for Detecting Milk Fat Adulteration

The substitution of vegetable fats and animal body fats for milk fat in dairy products has become more prevalent in recent years. Two methods have been developed for detecting milk fat adulteration in dairy products.

### Brown Colored Material in Milk Studied

Investigations are in progress to isolate and purify the brown colored substances formed in milk processed at high temperatures (200°-300° F.) to determine their chemical structure.

# New Processing Procedures and Products Effect the Properties of Ice Cream

The dairy industry has recently shifted to an extensive use of high-temperature, short-time pasteurization ice cream mix. This change in processing has necessitated the formulation of new stabilizers in order to produce a smooth, palatable finished product. Early results indicate that products such as sodium caseinate, delactosed products, and modified milk protein products can be used advantageously in the manufacture of ice cream.

taining virulence of *Pseudomonas caryophylli*, the causal organism of bacterial wilt of carnations. Considerable attention is being devoted to a study of bacterial pathogen, so that it can be grown readily in culture media and maintained under various conditions.

# The Species of Nematodes Causing Root Knot and Other Diseases in Roses Investigated

A partial survey has been made of commercial growers of roses in the eastern part of the United States. The results indicate that *Pratylenchus* (the meadow nematode) and *Xiphinema* (the dagger nematode), are causing difficulty in the growth of greenhouse roses. Tests are being made to determine means of controlling these diseases.

# Seed Treatment Tests for Field Legumes and Grasses

Preliminary studies are in progress on seed treatment tests for alfalfa, ladino clover, and red clover using Arason, Spergon, Phygon, and Panogen.

# H. DAIRY

# DAIRY PRODUCTION

# Additional Information Obtained on the Cause and Treatment of Ketosis

In addition to the use of corticotropin (ACTH) and cortisone as a treatment for ketosis in the past few years, several related materials were tested. A new cortisone-like substance, 11-oxyprogesterone, was found to be effective during the past year in the treatment of ketosis.

# New Hormone Preparation Stimulates Milk Production

A highly purified hormone preparation from the pituitary gland (Armour growth) increased the milk production of six experimental cows by 50% in late lactation. Blood chemistry data did not reveal any clues as to the mode of action of growth hormones in increasing milk production.

# Additional Information Obtained Concerning Fat Requirements in the Dairy Ration

Feeding experiments during the last two years have demonstrated that high fat rations would increase the butterfat test and total butterfat production for about two weeks. Continued tests showed that the production of milk and milk fat leveled off after this period and remained at the same level through the rest of the lactation period.

# Tests Indicate Rumen Bacteria Responsible for Many Chemical Reactions

Fifteen compounds known to be involved in carbohydrate and fat metabolism and twenty-four nitrogen-containing substrates have been tested during the past year with mixed suspensions of bovine rumen

## I. ENTOMOLOGY

## Proper Timing of Treatment Necessary for Corn Earworm Control

Results of two years of experiments indicate that the timing and number of sprays necessary to control the corn earworm vary with the seasonal abundance of the pest. With comparatively light infestation first sprays may be delayed until 25% or more of the ears are in silk. When heavy infestations occur in late season applications of insecticide must be made earlier and more than two treatments are required.

## Increased Yields of Cucumbers Possible with Insecticides and Fungicides

Tests with various sprays indicate that to assure a stand of pickling cucumber plants early applications of insecticides are often necessary. Cucurbit wilt can be eliminated if insects are controlled, and insecticide treatment do not appear necessary after the plants begin to bloom unless the melon aphid appears. Fungicides are of little value in early sprays, but may be necessary after plants begin to bear to keep down disease and prolong the picking.

## Pea Aphid Control Investigations Completed

Research relative to the pea aphid began in 1937, and has resulted in various satisfactory methods by which canners can control this pest. Early work centered around rotenone insecticides which had replaced nicotine at the beginning of the period. About 1945, DDT replaced rotenone, and recently the former has been replaced by various organic phosphorous insecticides. Tests have shown that of the organic phosphorous materials Malathon has outstanding merit for pea aphid control.

## Two Insecticides Effective in the Home Garden Aerosol

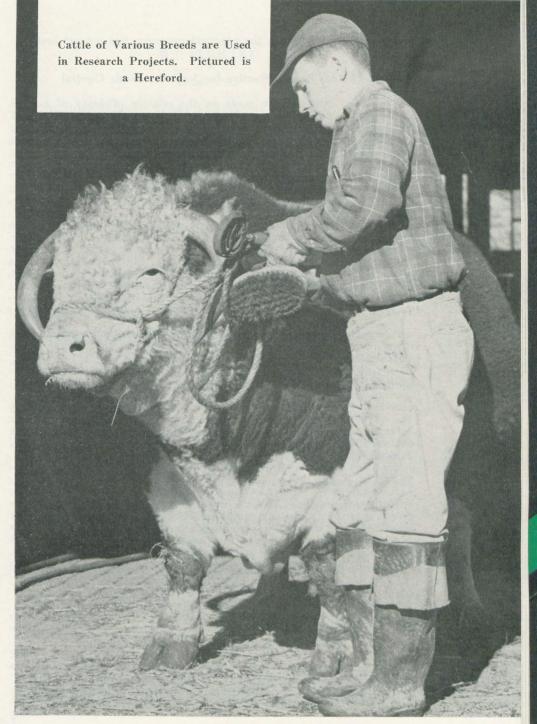
A combination of 2% Dilan and Lindane is the best formulation found, to date, for general effectiveness against vegetable insects. Lindane, however, may impart an off-flavor to some crops, particularly potatoes when frequent treatments are made near harvest time. No off-flavor from this material occurs in melons, cucumbers, cabbage, or other leafy crops that are eaten uncooked.

## Yields Increased by Spraying Beans

Information has been obtained on the effect of insect control on yields, the minimum number of insecticide treatments necessary, and the timing of treatments in relation to the seasonal activity of the insects involved. Two newer insecticides, Malathon and Dilan, have been found to be highly effective against the Mexican Bean Beetle, and has resulted in increases of both snap and lima bean yields.

## Insecticides in Concentrated Sprays Found Highly Effective

Experiments are in progress using potatoes, tomatoes, and cucurbits to determine the minimum amounts of water necessary for applying fungicides and plant nutrients. Preliminary results indicate that the amount of water per acre may be greatly reduced from the 150 gallons



usually recommended, but the practical minimum has not yet been determined.

## New Insecticides Found Effective for Japanese Beetle Control

Evaluation studies were made on the relative efficiency of several of the newer insecticides, namely, Dilan, Malathon, Metacide, EPN, and NPD. Two plant systemics, Systox and Octomethyl Pyrophosphoramide, designed to make the plant itself poisonous to beetles were also tested. All the insecticides under test, with the exception of the two systemics, were effective in destroying the Japanese beetle when used at proper dosage levels and were safe on most foliage.

### Corn Planting Time Influences Corn Borer Infestation

Evidence indicates that the pattern of infestation, as well as the amount of damage from the corn borer, is largely the result of the relationship between planting dates and corn development. Very early and very late corn is always more heavily infested than mid-season corn. If the planting date for all corn in a community was delayed until after May 15, the problem of infestation would be greatly reduced.

### Tests on Parasites Continue as Means of Corn Borer Control

European corn borer parasite liberations were continued in restricted areas in the state, particularly Allegany and Garrett Counties where the corn borer has recently become established.

## Methods of Controlling Sap Beetles Studied

Evidence indicates that the sap beetle was most damaging to corn that had previously been injured by the Japanese beetle, European corn borer, or some other insect. Laboratory tests indicate that DDT is not as effective an insecticide as Aldrin, Toxaphene, Lindane, EPN, Parathion, and Metacide for eliminating the sap beetle.

#### The Control of Orchid Pests Studied

Work was completed and the material published on the mite Brevipalpus Australis. The biology and control of a new Eriophyid mite was completed and a control formulated. In addition the control of the Florida red scale on Coelogyne, the Lantana aphid on Epidendrums, and an undetermined mealy bug on Phaius was devised.

## J. HORTICULTURE

## VEGETABLES

## Two New Varieties of Sweet Potatoes Released for Maryland

The results of three years of testing culminated in the release of two new varieties of sweet potatoes in the spring of 1953. The "Sunnyside" and "Oklahoma 46" varieties should be available in moderate supply, for commercial planting in 1954.

### New Vegetable Varieties Tested

One important phase of the research in horticulture is to determine whether the new varieties of vegetables developed by plant breeders are adaptable to local conditions before they are released for general distribution. Under this program six varieties of cantaloupes, seven varieties of snap beans, eighteen varieties of peas, and several types of broccoli were tested for yield and quality.

## Spraying Nutrients on Tomatoes Increases Monetary Returns

Three years of testing have shown that the yields of tomatoes and the quality of tomatoes may be markedly increased and improved by the foliar application of fertilizer materials. Cost analysis showed an increase in net return of \$50 per acre from the use of plant nutrients such as magnesium sulphate and borax in the spray schedule.

## Tomato Breeding Program Results in New Variety

The Chesapeake, a new tomato variety developed from a 3-way cross, was released last spring. The advantages of the Chesapeake are its high degree of resistance to fruit cracking, resistance to Fusarium wilt, and yields of marketable fruit are approximately 20% greater than other varieties.

## FLORICULTURE AND ORNAMENTALS

## Storage Conditions of Hydrangeas Influence Growth and Flowering

A study has been in progress on the effect of storage temperatures and the absence or presence of light during storage on subsequent forcing of hydrangeas. It was found that the plants defoliated by the end of four weeks under all storage conditions. Light had no influence on growth nor the number of days required for forcing. Storage temperatures and duration of storage had the most influence, and a storage temperature was found to be most effective in termination of dormancy and stimulation of plant growth.

## Azalea Fertilization Influences the Production and Survival of Cuttings

The nutrition of the plant from which Azela cuttings are taken influences the number of cuttings produced, their ability to form roots, and the possibility of the cuttings surviving. Tests indicate that it is greatly advantageous to maintain well fertilized plants for propagation purposes.

## Chemical Soil Conditioners Tested for Greenhouse Use

The use of new synthetic soil by greenhouses for ornamental plants has many possibilities since manure, peat, or other organic materials may be expensive or difficult to obtain. Preliminary experiments have shown that "Krilium" is a beneficial material for poinsettia growth. It was most effective when used with a soil mixture containing peat.

# Investigation of Rose Varieties for Resistence to Black Spot Disease in Progress

Studies with rose blackspot fungas, Diplocarpon rosal, have established definite races of the pathogen. Morphological races have also been demonstrated using isolates of the pathogen grown in pure culture. The genus Rosa has resisted blackspot disease and offers hope for the establishment of a line of blackspot-resistant-hybrids.

## Breeding Roses for Increased Keeping Quality Investigated

Growth regulating substances have been used in an effort to increase the set of seed following pollination. To date the best material tested for this purpose is napthaleneacetamide.

## Search Underway for Objective Measurement of Flavor

Flavor is the most important factor in food quality, and since no practical objective method to test this factor is available, a statistical approach has been initiated using a taste testing panel. In this manner trained tasters score food for flavor quality, and these scores are analyzed statistically for differences. Studies are in progress using the "multiple comparison" test to develop a more efficient taste panel procedure.

## Formula Developed for Predicting Color Loss in Tomato Products

Color is a very important factor in gaging quality of tomato products. Experiments were conducted to determine the effect of heat on color loss in processing.

## Efficient Sampling Procedures Cut Cost of Grading Tomatoes

Tests indicate that to judge large quantities of tomatoes marketed by the truck load, the most efficient sampling procedure is the removal of ten tomatoes from each basket.

#### FRUIT

## New Chemical Eliminates Hand-Thinning of Apples

The results of recent chemical-spray thinning of apples has eliminated the expensive hand-thinning operation necessary in the past. Tests indicate that the new material, naphthalene acetamide, is the most promising chemical for post-bloom spray thinning of summer varieties.

## Leaf Analysis Survey of Orchards Used for Fertilizer Recommendations

The value of leaf analysis for plant nutrient elements has been established as a diagnostic tool in determining the nutrient status of the plant. In the summer of 1952 a nutritional survey of the apple and peach orchards in Maryland was made by chemical analysis of leaf samples covering all the orchard sections of the State. The data obtained has been used to correlate vigor and productivity of the tree with levels of nutrient elements in the leaf as a basis for fertilizer recommendations.

## K. POULTRY

#### BREEDING

#### Flightless Strain of Broiler Chickens Developed

Experiments have been in progress since 1949 with New Hampshire and White Leghorn chicks to develop a strain of chickens without flight feathers. These large wing feathers are not essential to the welfare of the bird, and their removal will facilitate broiler dressing operations. The strain of flightless stock developed has a normal appearance, and the loss of flight feathers after the first molt does not hinder the activity of the birds.

#### Strain Comparison for Broiler Production

Experiments measuring the differences in commercial strains of broilers with respect to the growth rate and feed efficiency were expanded to obtain additional data relative to the White Plymouth Rock and New Hampshires. It was concluded that the two strains were nearly comparable in growth rate, and that feed conversion is primarily a function of growth rate.

### Medium-Sized Strain of Turkeys with Certain Qualities Sought

Selections of various strains of turkeys, aimed at combining good reproductive ability with rapid growth and good confirmation, have been in progress during the past five years. Further selection will be based upon the reproductive ability of the parents, freedom from broodiness, growth rate, and color.

## Hormonal Control of Economic Traits in Poultry Studied

The level of thyroid activity and the effects of male and female hormones on the resistance of chickens to muscular fatigue were investigated. It was found that thyroxin aided in the resistance to stress, however, the adrenal is probably a more important factor influencing resistance. Results indicate that the male sex hormone increases the ability of a chick to resist strain, and that the pituitary gland is capable of secreting high levels of both thyrotopin and adrenocorticotropin simultaneously.

# Differences in Thyroid Activity as Related to Strain Differences Under Observation

To determine the importance of thyroid activity in the resistance of chicks to Newcastle disease, studies are continuing with various strains of birds that differ markedly in their thyroid response to thiouracil.

## Semen Studies with Chickens and Turkeys Continued

Investigations were made concerning the possibility of extending the usefulness of semen with antibiotics, hormones, and extenders. One of the most useful dilutents found was whole milk to which either the male or female hormone had been added.

#### POULTRY NUTRITION

#### Broiler Finishing Rations Conserve Protein and Reduce Costs

Tests indicate that the protein level of broiler rations may be reduced 18% after the broilers are seven or eight weeks old. This can be accomplished by reducing the level of soybean meal and adding additional ground corn to broiler starting rations.

#### Further Study of Methionine Supplementation to Broiler and Turkey Rations

The effectiveness of adding synthetic amino acid (DL-methionine) to broiler rations has varied greatly. In general, the addition of amino acid has increased the return over feed costs more than enough to offset the cost of methionine. Further studies are in progress to determine more fully the practical role of DL-methionine in present day feeds.

## Aureomycin HCl and 3-Nitro-4-Hydroxyphenylarsonic Acid Found to be Mutually Supplemental

The addition of 10 grams of Aureomycin HCl plus 45 grams of 3-nitro-4-hydroxyphenylarsonic acid to broiler rations improved the growth rate of broilers up to ten weeks of age more than when either supplement was fed alone.

#### Use of Lysine in Chick Rations Studied

In studies involving purified chick rations containing wheat gluten and isolated soybean protein it was found that supplemental lysine, beyond the .9% which had been considered adequate, further increased the growth rate of chicks.

#### Fundamental Studies on Unidentified Growth Factors Continued

Studies have been furthered on the multiplicity of factors of the "unknown growth factor complex", the development of more sensitive assay procedures, the fractionation and purification of two distinct unidentified chick growth factors, and practical investigations designed to determine sources of these factors.

## Fish Solubles Contains an Unidentified Factor Required for Hatchability

Tests made with various hens indicate that fish solubles contain an unidentified factor required for hatchability of eggs.

#### The Role of Wheat in Pullet Disease Studied

Investigations have been in progress for a number of years to determine the role of wheat in pullet disease. Results indicate that there are significant differences in germination and bacterial content of wheats some which favored the appearance of pullet disease and others that did not.

#### L. RURAL SOCIOLOGY

#### Use of Labor on the Lower Eastern Shore Studied

Truck-crop farmers were asked to compare their experiences in 1952 and 1951 with respect to methods of recruiting, hours worked, wages paid, and supply and retention of harvest laborers. The results indicate that the large truck crop operator (80 acres or more) belonged to labor camp associations, and used placement services of public agencies. The large operator usually maintained a continuous employer-employee relationship, and made pre-season arrangements with harvest laborers. He usually used migratory workers rather than local labor, and adjusted his organization of enterprise to efficiently employ farm labor.

#### The Family in the Rural-Urban Fringe

This study investigated the relationship existing between family type and selected social and economic data, and the relationship between family type and intra-family participation in community organizations. The most significant conclusion of this study stresses the positive association observed between high participation within the family and high participation in community activities.

## M. SOIL CONSERVATION

The research pertaining to soil conservation is a cooperative venture between the U. S. Department of Agriculture Soil Conservation Service-Division of Research, and the Maryland Agricultural Experiment Station.

## Ridge Row Culture Studied

Experiments with ridge row culture of tobacco are continuing so that a method of preventing cross wash erosion of the soil can be achieved and an efficient drainage system for crop rows can be developed.

## Winter Cover Crop Management for Tobacco Continued

Tests using vetch with wheat, rye or ryegrass as a cover crop resulted in an increased return, as compared with the value of tobacco grown with ryegrass or no cover at all.

## Rotations for Tobacco Investigated

Preliminary studies of tobacco rotations indicate that two and three year rotations have many practical advantages over continuous growth. More comprehensive studies of this problem are now in progress.

## Supplemental Irrigation of Tobacco Studied

Preliminary studies with supplemental irrigation on light textured soils indicates that increased production is difficult to obtain because of the leaching associated with the near-coincidence of irrigation and subsequent rainfall.

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A419. A Study of the Physiological Mechanisms Affecting Specific Gravity of Chicken Eggs. A. R. Gabuten and C. S. Shaffner. *Poultry Sci.* (in press).

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A421. An Arched-Neck Character in Chickens. M. H. Conner and C. S. Shaffner. J. Heredity (in press).

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Maryland Flock available for Sheep Research

	AND AGRICULTURAL EXPERIMENT STATION CURRENT PROJECTS—1952-1953	A-26-ac	Reducing Costs, Determining and Maintaining Quality, Increasing Efficiency in Marketing Maryland Poultry Products. H. D. Smith and Francis Dallavalle.
Agricultu	al Economics and Marketing	A-26-ad	Possible Economies in the Marketing and Transportation of
Project No.			Poultry Meat. H. D. Smith.
A-18-ae	Organization and Operation of Representative Types of Farms in Maryland. A. B. Hamilton and W. D. Stevenson.	A-26-ae	Lowering Marketing Costs: Increasing Efficiency in the Operation of Milk Receiving Processing and Distribution Facilities. G. M. Beal and C. E. Twining.
A-18-ag	Agricultural Productive Capacity and Efficiency. A. B. Hamilton and P. E. Nystrom.	A-26-af	Sub. 1. Collection of Basic Data on Marketing Shenandoah- Cumberland Apples. R. L. Childress, C. B. Anslinger and
A-19-k	Recent Tax Changes in Maryland and Their Effect on Farm-		P. R. Poffenberger.
APPENDING TO	ers' Tax Obligations. P. E. Nystrom, W. P. Walker and P. R. Poffenberger.	A-26-af	Sub. 2. Processors as a Market Outlet for Cumberland-Shenandoah Apples. R. L. Childress and P. R. Poffenberger.
A-19-m	Rural Cooperative Credit. P. R. Poffenberger, W. P. Walker and R. W. Roberson.	A-26-ag	Marketing of Maryland Type 32 Tobacco. G. M. Beal and Paul Summers.
A-19-n	Economic and Security Aspects of Rural Fire Protection and Prevention in Maryland. W. P. Walker, P. R. Poffenberger, F. E. Hulse, L. C. Biser and E. M. Downey.	A-26-ah	Marketing Maryland Forest Products. G. M. Beal and B. R. Roberson.
A-19-o	Conservation and Economy in Rural Transportation of Persons, Supplies and Farm Commodities. W. P. Walker, L. C.	A-26-ak	A Study of Related Practices and Egg Quality in Baltimore. H. D. Smith, R. C. Hawes, J. Horne and A. Lundquist.
	Biser, F. E. Hulse and E. M. Downey.	A-32-f	Farm Tenancy and Leasing Arrangements in Maryland.
А-19-р	Factors Affecting the Cost of Certain Kinds of Insurance to		L. B. Bohanan and A. B. Hamilton.
	Farmers. W. P. Walker, P. R. Poffenberger and F. E. Hulse.		The Effect of Drainage Upon Crop Yields, Farming Practices and Land Utilization. L. B. Bohanan.
A-19-q	Maryland Tax Assessment Practices Concerning Various Classes of Poultry. W. P. Walker and H. D. Smith.	A-32-i	Rural Zoning in Maryland. L. B. Bohanan.
A-26-1	Prices Paid by Farmers for Commodities Bought. P. R. Poffenberger.	Agricultur	ral Education

The Marketing and Distribution of Maryland Canned Vegetables. D. J. Burns.

Possibilities of Education with Adult Farmers. R. A. Murtables. D. J. Burns.

Poffenberger.

A-26-ab

#### Agricultural Engineering

- R-11-c Mechanization of Tobacco Production. R. W. Carpenter, G. J. Burkhardt, P. N. Winn, Jr., E. W. Martin, O. E. Street and Claude McKee.
- R-11-d Tobacco Housing. R. W. Carpenter, G. J. Burkhardt, P. N. Winn, Jr., E. W. Martin, O. E. Street and Claude McKee.
- R-11-e Structures and Equipment for Tobacco Stripping. R. W. Carpenter, G. J. Burkhardt, P. N. Winn, Jr., E. W. Martin, O. E. Street and Claude McKee.
- R-12 Drying Ear Corn with Natural Air in Maryland. G. J. Burkhardt, H. J. Hofmeister, Jr., P. N. Winn and R. G. Rothgeb.
- R-14 Mow Curing Hay in Maryland. H. J. Hofmeister, Jr.
- R-15 Development of Equipment and Improved Methods for Harvesting Canning Tomatoes and Bush Beans, H. J. Hofmeister, Jr.

#### Agronomy

- B-39 Varietal Improvement of Wheat. R. G. Rothgeb, J. L. Newcomer, J. H. Axley, H. B. Winant and J. R. Miller.
- B-41 Barley-Variety Testing. R. G. Rothgeb.
- B-43 Soybean Production in Maryland. R. G. Rothgeb, R. C. Leffel and S. P. Stabler.
- B-44 Sweet Corn Improvement. R. G. Rothgeb.
- B-50 Improvement of Dent Corn. R. G. Rothgeb.
- B-56-a Improvement of Red Clover Adapted to Maryland. A. M. Decker, T. S. Ronningen and C. H. Liden.
- B-56-b Pasture Renovation Studies. A. W. Burger, T. S. Ronningen and A. O. Kuhn.
- B-56-f The Evaluation of Forage Crop Varieties and Strains for Their Use and Adaptation in Maryland. T. S. Ronningen, A. W. Burger and A. O. Kuhn.
- B-56-g Development and Maintenance of Superior Ladino Clover Breeding Material. T. S. Renningen.
- B-56-i Orchard Grass Breeding. T. S. Ronningen and A. W. Burger.
- B-56-j Grass and Legume Combinations for Beef Production. A. W. Burger, J. E. Foster, E. C. Spurrier and T. S. Ronningen.
- B-56-k Phenological Studies in Forages. A. M. Decker, Jr., T. S. Ronningen and H. C. S. Thom.
- B-56-l Variety and Strain Testing of Forage Legumes and Grasses in Maryland. T. S. Ronningen and A. M. Decker, Jr.
- B-57 The Improvement, Production and Use of Rye in Maryland. R. G. Rothgeb.
- B-58-a Control of Weeds in Corn by the Use of 2, 4-D, Preparations. A. M. Decker and R. G. Rothgeb.
- B-58-b Control of Weeds in Legumes. A. O. Kuhn and A. M. Decker.
- B-59 Improvement in Plant Bed Management for Maryland Tobacco. O. E. Street, O. D. Morgan, Jr., and J. E. McMurtrey, Jr.

- B-60 Tobacco Fertilizer Rates and Placement in Relation to Plant Population. O. E. Street, C. G. McKee, A. O. Kuhn and J. E. McMurtrey, Jr.
- B-61 Effects of Cropping Systems on Soil Properties and Productivity. Edward Strickling, R. G. Rothgeb and A. O. Kuhn.
- B-64 Testing Commercially Acceptable Maryland Tobacco Varieties as Related to Quality. L. R. DeLoach and O. E. Street.
- O-28-b A Study of the Formula and Analysis for Late Potatoes. J. H. Axley and H. B. Winant.
- O-43 Hydrologic Studies with Reference to Soil Moisture Conservation, Soil Fertility and Flood Control. R. G. Rothgeb, Mitchell Thompson, T. S. Ronningen and H. W. Hobbs.
- O-45-b A Study of the Availability of Phosphate Material. H. B. Winant, S. P. Stabler and J. H. Axley.
- O-48 A Study of the Reclassification of Soils and the Adaptation of These Classes to Soil Conservation Work in Maryland. J. H. Axley, A. O. Kuhn, S. P. Stabler, F. L. Bentz, H. B. Winant and G. A. Bourbeau.
- O-51 Alfalfa Fertility Studies. J. H. Axley, H. B. Winant and J. R. Miller.
- O-52 A Study of Soil Tests as an Index of Phosphate Availability to Plants, J. H. Axley and H. B. Winant.
- O-53 Effects of Soil Physical Factors on Crop Production. Edward Strickling and R. G. Rothgeb.

## Agronomy—Seed Inspection

- N-7 Inspection of Seeds Sold Throughout the State. J. L. Newcomer, M. H. Day and A. O. Kuhn,
- N-8 Examination of Samples from Seeds Sold Throughout the State. F. S. Holmes, O. M. Kelk, E. P. Emack, A. H. Ferguson and R. W. Caldwell.
- N-9 Examination of Samples Submitted to the Laboratory. F. S. Holmes, O. M. Kelk, E. P. Emack, A. H. Ferguson and R. W. Caldwell.

## Animal Husbandry

- C-14 A Study of the Productiveness of Purebred Beef Cattle in Maryland. W. W. Green, J. E. Foster, J. Buric and W. J. Corbett.
- C-14-a Effect of Early Weaning on the Duration of Maternal Influences in Beef Calves. W. W. Green, J. Buric, J. E. Foster and W. J. Corbett.
- C-14-b Type Classification as an Aid in Selection of Beef Breeding Cattle. W. W. Green, J. E. Foster and J. Buric.
- C-14-c Studies on Bodily Conformation and the Correlations Between Live-Animals Measurements and the Weight and Other Characteristics of Carcasses of Wholesale Cuts in Beef Animals. W. W. Green.
- C-18 A Study of the Causes and Prevention of Bloat in Beef Cattle on Pasture. E. C. Leffel, J. E. Foster, S. P. Stabler and J. C. Shaw.



Eastern Shore Hereford Cattle used in research

- C-20 The Development of Superior Lines of Swine Based in Crossbred or Purebred Foundations. W. W. Green, M. H. Kerr, J. E. Foster, J. Buric and W. J. Corbett.
- C-21 The Effect of Specific Metabolites Upon Growth Rate and General Condition of Sheep. E. C. Leffel, J. E. Foster and J. C. Shaw.

#### Animal Pathology

- D-46 Investigations on Brucellosis of Cattle. Cornelia M. Cotton.
  D-50 Anaplasmosis of Cattle. L. J. Poelma, Kenneth Price and
  J. Walter Hastings, Sr.
- D-51 Experiments with Infectious Enterohepatitis (Blackhead) of Turkeys. H. M. DeVolt, Anita Holst and Frank Tromba.
- D-52 Newcastle Disease Investigations with Particular Reference to Vaccine Modifications and Virus Study. R. L. Reagan, W. C. Day, D. M. Schenck and A. L. Brueckner.
- D-53 A Study of Rumen Fermentation and Ruminant Metabolism with Emphasis on Their Relation to Ketosis. R. B. Johnson.
- D-54 Infectious Bovine Mastitis: Comparison of Different Methods of Diagnosis, Treatment and Control in the Same Herd, Comparison of Costs and Returns. E. M. Sacchi and Mrs. H. O. Lineweaver.

#### Botany

- F-9 Cytogenetic Studies in the Genera Ipomoea, Gladiolus and Tulipa. R. Bamford, D. T. Morgan, Jr., R. A. Rappleye and R. N. Stewart.
- F-12 The Native Plants of Maryland, Their Occurrence, Distribution and Economic Importance. R. G. Brown.
- F-15-a Heterosis in Hybrids from Homozygous Pepper Lines Obtained from Haploid Plants. D. T. Morgan, Jr., R. D. Rappleye and R. Bamford.
- J-78-a Breeding for Resistance to the Red Stele Disease of Strawberries Caused by *Phytophthora fragariae* Hickman and Studies Necessary to Facilitate the Development of Re-

- sistant Varieties and Other Control Measures. W. F. Jeffers, J. G. Kantzes and D. H. Scott.
- J-86-a Methods of Controlling Diseases Affecting Commercial Production of Sweet Potatoes in Maryland. W. F. Jeffers, C. E. Cox, J. G. Kantzes.
- J-87 Treatments for Control of Seed and Soil Borne Diseases of Vegetable Crops. C. E. Cox, H. D. Sisler, Paul Hochstein and Morton Marshall.
- J-88 Development of Identification and Control Procedures for Plant Virus Diseases in Maryland. W. F. Jeffers, L. O. Weaver, O. D. Morgan, J. R. Keller, O. E. Street, E. E. Clayton, D. A. Scott and G. M. Darrow.
- J-89 Development of Improved Strains of Maryland Tobacco Resistant to Diseases. O. D. Morgan, O. E. Street and E. E. Clayton.
- J-90 Adaptability of Disease Resistant Varieties of Potatoes to Maryland, C. E. Cox and J. G. Kantzes.
- K-8-b A Determination of the Concentrations of Various Inorganic and Organic Components Coincident with Maximal Yields of Certain Crop Plants in Maryland. H. G. Gauch and W. M. Dugger, Jr.
- K-8-c The Role of Trace Elements in Plant Nutrition. H. G. Gauch and W. M. Dugger, Jr.

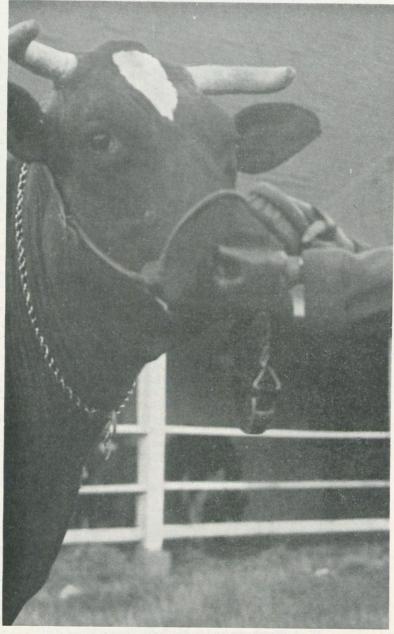
## Dairy Husbandry

- G-34 Chemical Changes in Milk Fat as Related to the Flavor of the Milk. Mark Keeney and J. F. Mattick.
- G-35 The Analysis of Dairy Products. Mark Keeney, J. F. Mattick, W. S. Arbuckle and J. S. Conrad.
- G-37 The Feeding and Management of the Cow During the Dry and Freshening Period. J. C. Shaw, J. W. Pou, Janet Gilbert, B. C. Hatziolos, W. M. Gill and R. A. Gessert.
- G-38 The Fat Metabolism of the Mammary Gland. J. C. Shaw, J. W. Pou, R. E. Brown and A. C. Chung.
- G-39 Factors That Affect the Availability of Nutrients in Feeds and Their Influence Upon Blood Composition and Milk Secretion. J. C. Shaw, J. W. Pou, H. M. Irvin, R. N. Doetsch and R. A. Gessert.
- G-40 The Influence of High Temperature Heat Treatment on Certain Physical and Chemical Properties of Milk. Mark Keeney, T. A. Fitzpatrick, Ibrahim Rifaat, and Louis Cremers.
- G-42 Methods of Processing and Other Factors Affecting the Quality of Ice Cream. W. S. Arbuckle, E. A. Corbin and Louis Cremers.
- G-43 The Metabolism of Acetate, B-hydroxybutyric Acid, Glucose and Other Carbon Compounds in Lactating Ruminants.
  J. C. Shaw, S. Lakshmanan, S. Kumar and D. R. Jacobson.

### Entomology

H-29-g Insecticidal Control of the Mexican Bean Beetle. L. P. Ditman and J. G. Burkhardt.

Environmental Factors and Cultural Practices in Relation L-74 Pea Aphid Control by Low Volume Sprays with Ground and H-29-h to the Growth and Fruiting Responses of Fruits. A. H. Air Application. L. P. Ditman, G. J. Burkhardt, Amihud Thompson, E. A. Stahley and I. C. Haut. Kramer and H. S. Todd. Relation of Environmental and Soil Factors to the Cracking L-74-a The Relation of Control of Cucumber Insects to Yield of H-29-i of Sweet Potatoes. L. E. Scott, F. C. Stark, W. A. Mat-Quality Pickles. L. P. Ditman, F. C. Stark and C. E. Cox. thews, A. A. El-Kattan, W. L. Ogle and A. A. Duncan. Chemical Control of the Corn Earworm. L. P. Ditman and H-29-j Mineral Nutrition of the Strawberry with Particular Refer-L-79-a H. S. Todd. ence to Effects of Calcium, Potassium and Magnesium on Biology and Control of Tobacco Insects. Sub. 1. The Tobacco H-40 Growth and Fruiting. I. C. Haut, L. E. Scott and A. A. Horn Worms. H. S. McConnell and E. N. Cory. Piringer. The Biology and Control of the European Corn Borer Under H-43 Develop Objective and Easily Applied Measures of Quality Q-58-f Maryland Conditions. E. N. Cory, H. S. McConnell, G. S. Factors Involved in Market Grades and Standards. A. Langford and R. M. Lee. Kramer, I. C. Haut, L. E. Scott, H. S. Todd, Eugenia Liquefied Gas Propelled Sprays for the Home Gardner. H-46-c Sokolov, A. A. Kornetsky, V. H. Nicholson, Ralph Kierstead L. P. Ditman, H. B. Owens and Amihud Kramer. and William Hudson. Studies on the Efficiency of Fixed Boom Low Volume Spray-Development of Methods of Preparation of Canned and H-46-d Q-58-h ers. L. P. Ditman, G. J. Burkhardt, Francis Stark, C. E. Frozen Tomato Concentrates. E. P. Walls and I. C. Haut. Cox, Amihud Kramer and H. S. Todd. Improvement of Quality of Processed Tomatoes and Tomato Q-58-i The Control of Orchid Pests. E. N. Cory, Elizabeth Havi-Products. A. Kramer, F. C. Stark, H. S. Todd, A. A. El-H-50-a land, G. R. Manglitz and W. C. Acheson. Kattan, W. A. Ogle and Eugenia Sokolov. Patuxent Project on the Effect of Soil Conservation Upon Suitability of Various Materials for Use as Containers for H-56 Q-58-j Frozen Vegetables. A. Kramer, Martha Lasky, Eugenia Insect Populations. H. B. Owens, E. N. Cory and L. P. Dit-Sokolov and B. A. Twigg. A Taxonomic Study of the Coccid Genus Toumeyella and Q-58-1 The Effect of Corn Syrup Upon the Color of Tomato Ketchup. H-58 W. L. Ogle, Eugenia Sokolov and A. Kramer. Some Closely Related Genera. H. S. McConnell. Flavor Evaluations by Taste Test Panel Methods. A. Kramer, Q-58-m F. C. Stark, I. C. Haut, E. P. Walls, C. F. Evers, L. P. Dit-Home Economics man, C. E. Cox and D. H. Scott. The Utilization of Protein by Normal College Women, P. F. Suitability of New Varieties of Horticultural Crops for Y-1 Q-58-n Canning and Freezing. B. A. Twigg, W. A. Matthews, H. S. Brauscher and H. N. Wilson. Todd, F. C. Stark and A. Kramer. Q-67-a The Influence of Organic Residues in the Production of Horticulture Asparagus. F. C. Stark. Rooting of Ornamental Plants Difficult to Propagate. C. B. A Study of Regional Adaptation of Certain Vegetable Crops I-26-a Q-74 Link, J. B. Shanks and L. J. Enright. and Varieties in Maryland. F. C. Stark, A. A. Duncan, W. A. A Physiological Study of the Keeping Qualities of Cut Flow-Matthews and L. E. Scott. I-58-a ers as Influenced by Packaging. J. B. Shanks, C. B. Link Crop Management Studies with Vegetable Crops. F. C. Q-77 and J. E. Hawes. Stark, A. A. Duncan, L. E. Scott and W. A. Matthews. Effect of Environmental Factors and Cultural Practices on I-74-a The Mineral Levels and Interrelationships of Mineral Nu-Q-79-b the Growth and Flowering of Hydrangeas and Azaleas. C. trients in Fruit Plantings of Maryland. L. E. Scott, A. H. B. Link and J. B. Shanks. Thompson, C. O. Dunbar, John Popenoe, Virginia France The Mineral Nutrient Requirements of the Azealea, C. B. and S. E. Maximos. I-79-a Link and J. B. Shanks. Influence of Nutrient Intensity and Balance on the Quality Q-79-c The Mineral Nutrition of the Hydrangea. J. B. Shanks and and Physiological Defoliation of Cantaloupes. F. C. Stark, I-79-b C. B. Link. W. A. Matthews and S. H. Todd. Determination of Varietal Adaptability of Maryland Grown Q-79-е Influence of Nutrient Intensity and Balance Upon the Yield L-58-g Apples to Making of Canned and Frozen Concentrates and and Quality of Tomatoes. F. C. Stark, A. Kramer, W. A. Development of Improved Methods of Preparation. E. P. Matthews, L. E. Scott and S. H. Todd. Walls and L. E. Scott. Mineral Nutrition of the Sweet Potato with Special Refer-Q-79-f Adaptation of Fruit Varieties and New Seedlings to Maryence to Cation Inter-relationships. L. E. Scott, F. C. Stark L-73 land. I. C. Haut and F. J. Lawrence. and W. L. Ogle.



From the University's Holstein Herd. Available for research purposes.

- Q-81 Cantaloupe Breeding and Selection with Particular Reference to Quality and Resistance to Defoliation. F. C. Stark.
- Q-82 Tomato Breeding and Selection with Particular Reference to Greater Resistance to Cracking and to Late Blight. F. C. Stark.

## Poultry Husbandry

- M-32-k Difference in Thyroid Activity as Related to Strain Differences in Growth, Feed Utilization and Feathering. C. S. Shaffner, W. E. Shaklee and H. L. Bumgardner.
- M-33-h Hormonal Control of Economic Traits in Poultry. C. S. Shaffner, A. Gabuten and M. H. Conner.
- M-33-i Development of a Flightless Strain of New Hampshire Chickens. C. S. Shaffner and M. A. Jull.
- M-33-j Semen Studies with Chickens and Turkeys. C. S. Shaffner, Phillip Bogdonoff and S. H. Qureshi.
- M-33-k Strain Comparisons for Broiler Production. C. C. Shaffner and M. A. Jull.
- M-34-e Medium Sized Strain of Turkeys with Certain Desirable Qualities. C. S. Shaffner and M. A. Jull.
- M-35-g The Requirement of the Growing Chick for Newer Members of the Vitamin B Complex. G. F. Combs, G. H. Arscott, H. L. Jones and G. B. Sweet.
- M-35-i Amino Acids in Poultry Nutrition. G. F. Combs, P. F. Twining and G. H. Arscott.
- M-35-k Unidentified Growth Factors for Chickens and Bacteria.

  Mary Shorb, G. F. Combs, F. A. Veltre, C. R. Brown, R. W. Bishop and G. L. Romoser.
- M-35-l Development of Improved Rations and Feeding Methods for Broiler Production. G. F. Combs, G. L. Romoser, C. K. Laurent and J. Nicholson.
- M-45 New Studies on the Causative Effects of Wheat in Pullet Disease. G. D. Quigley.

## Sociology

S-2 Some Characteristics of the Family in Prince Georges County, Maryland: A Study in the Rural Urban Fringe. H. H. Hoffsommer, Wayne Rohrer, John Schmidt and Sherman Fitzgerald.

# XI. Live Stock Sanitary Service

In addition to the research reported below the members of the Live Stock Sanitary Service conduct joint investigations with members of the Agricultural Experiment Station. The joint projects omitted in this section are included in the material of the State Experiment Station.

# Investigation of the Relationships of an Rh-Like Factor in the Production of Anemic, Icteric, and Unsound Foals of the Equine Population

Investigations of the relationship of an Rh-like factor in jaundiced foals indicates that appreciable losses are caused by blood incompatibilities of sire and dam. Rh-like diagnostic sera were used in compatibility tests prior to breeding, thereby controlling or preventing blood sensitizations that would normally lead to the production of anemic, jaundiced or unsound foals (colts). Work is continuing to eliminate the losses from this hemolytic disease.

## Investigation of Equine Influenza and Associated Respiratory Conditions

A significant development of the research conducted at the Grayson Laboratory was the successful isolation of a new strain of equine influenza virus. Cross protection experiments revealed that the U.S. Army strain (previously the only strain of virus available for research) will protect colts against injection by the Grayson strain, and the Grayson strain in turn affords protection from the former.

## Investigation of Air Sac Infection in Poultry

Investigations are in progress to determine the cause and to develop a means of diagnosing, preventing, and treating air sac infection in poultry. Experiments indicate the presence of two distinct types of structures, one that has some characteristics of a virus, and the other similar to bacteria.

#### **Publications**

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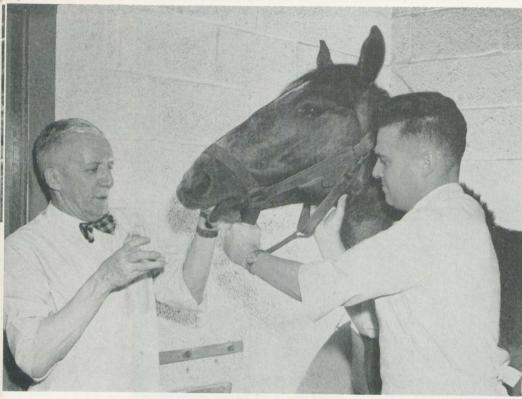
Reagan R. L., Schenck, D. M., Harmon, M. P., and Brueckner, A. L. Studies of West Nile Virus in the Swiss Mouse and Cave Bat. J. Bact.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Comparison of the Pseudorabies Virus in Mice and in Hamsters. *Proc. Book* (Vet. Meeting June 1952).

Reagan, R. L., Schenck, D. M., and Brueckner, A. L. Electron Microscope Studies of "B" Virus. Cor. Vet.

Reagan, R. L., Schenck, D. M., and Brueckner, A. L. Electron Microscope Studies of Pseudo Rabies Virus. Cor. Vet.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies of Newcastle Disease Virus in the Dog-Faced Baboon (*Papio porcarius*). Cor. Vet.



Colonel John H. Kintner and Dr. Thurman Grafton working with an infected horse.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies of "B" Virus Strain in Mice. J. Microbiology.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Comparison of Mouse Adapted NDV in Swiss Mice and Syrian Hamsters. Cor. Vet.

Reagan, R. L., Harmon, M. P., Day, W. C., and Brueckner, A. L. Studies of Measles Virus by Electron Microscopy. *Texas Med. J.* 

Reagan, R. L., Harmon, M. P., Day, W. C., and Brueckner, A. L. Comparison of Mouse Adapted and Rabbit Adapted "B" Virus in the Syrian Hamster. *Trop. Med. J.* 

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies of Pseudorabies in the Rhesus Monkey. Vet. Res.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies of West Nile Virus in the Baby Chick. *Proc. Soc. Exp. Biol. and Med.* 

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies by Electron Microscopy of the Virus of Rabies. Vet. Res.

Reagan, R. L., Day, W. C., Harmon, M. P., and Brueckner, A. L. Studies by Electron Microscopy of Erythrocytes from Mammals infected with Poliomyelitis. *J. Pathology*.

Reagan, R. L., and Brueckner, A. L. Response of the Baby Chick to Dengue Fever, Pseudo-Rabies, and Herpes Virus. Cornell Vet.

Reagan, R. L., Day, W. C., and Brueckner, A. L., Moore, Suzanne, and Kehne, Ellen. Studies of Rabies in Hamsters by Rectal Instillation. *J. Trop. Med.* 

Reagan, R. L., Schenck, D. M., Day, W. C., Moore, S., and Brueckner, A. L. Electron Microscopic Studies of Vole Rickettsiae. *Microscopic Society*.

Reagan, R. L., Day, W. C., Moore, S., and Brueckner, A. L. Studies of Varicella (Chicken Pox) by Electron Microscopy. *Med. J. Texas*.

Day, W. C., Moore, S., and Brueckner, A. L. Comparison of Tissue Culture Studies of NDV. Cor. Vet.

Reagan, R. L., Day, W. C., Moore, S., and Brueckner, A. L. Studies of Rabies in Hamsters. Cor. Vet.

Reagan, R. L., Day, W. C., Marley, R., and Brueckner, A. L. Studies of Pseudorabies in the Large Brown Bat. Vet. Res.

Reagan, R. L., Day, W. C., and Brueckner, A. L. Electron Microscopic Studies of Fox Encephalitis Virus. *Microscopic Society*.

Reagan, R. L., Strand, N., and Brueckner, A. L. Electron Microscopic Studies of Fox German Measles Virus. *Texas Medicine*.

Reagan, R. L., Day, W. C., and Brueckner, A. L. Study of Poliomyelitis and NDV in Monkeys and Chimps. *Vet. Meeting*, Toronto, Canada.

Reagan, R. L., Day W. C., Marley, R., and Brueckner, A. L. Morphological Observations by Electron Microscopy of Herpes Simplex Virus after Propagation in the Swiss Mouse. *Texas Medical Journal*.

Reagan, R. L., Day, W. C., and Brueckner, A. L. Studies of Various Rabies Strains in Mice and Hamsters Intracerebrally and after Rectal Instillation. *Proc. Soc. Exp. Biol. and Med.* 

Reagan, R. L., Day, W. C., and Brueckner, A. L. Studies of Herpes Simplex Virus in the Cave Bat. Vet. Res.

Reagan, R. L., Day, W. C., and Brueckner, A. L. Studies of RBC Cells by Electron Microscopy of Mice Infected with Herpes Simplex Virus. J. Pathology.

Palmer, Eddy, and Reagan, R. L. Failure to Demonstrate a Virus in Vague Nerve of Patients with Recurrent Duodenal Ulcer. *Texas Med. Journal.* 

Reagan, R. L., Day, W. C., and Brueckner, A. L. Electron Microscopic Studies of Four Strains of Chronic Respiratory Agent (Air Sac Disease of Fowl). *Poultry Science*.

Reagan, R. L., Orlowski, Mildred, and Brueckner, A. L. Response of the Puppy Dog to West Nile Virus. *Proc. Soc. Exp. Biol. and Med.* 

Reagan, R. L., and Brueckner, A. L. Electron Microscopic Studies of Yellow Fever Virus (17D Strain). J. Pathology.

Reagan, R. L., and Brueckner, A. L. Studies of "B" Virus in the Baby Chick. J. Trop. Med. and Hygiene.

Reagan, R. L., and Brueckner, A. L. Electron Microscopic Studies of Semliki Forest Virus. J. Pathology.

Reagan, R. L. and Brueckner, A. L. Electron Microscopic Studies of Bwamba Fever Virus. Vet. Research.

Reagan, R. L., and Brueckner, A. L. Dengue Fever Virus in Mice (Cortisone). Texas Medical.

Reagan, R. L., and Brueckner, A. L. Response of the Puppy Dog to Dengue Fever Virus. *Cor. Vet.* 

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Response of the Swiss Albino Mouse to Semliki Forest Virus by Rectal Instillation. Cor. Vet.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Response of Young Dogs to Semliki Forest and Bwamba Virus. J. Proc. Soc. Exp. Biol. and Med.

Reagan, R. L., and Brueckner, A. L. Electron Microscopic Studies of Zika and Ntaya Viruses. *Texas Medical*.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Response of the Baby Chick to Ntaya, Semliki Forest and Bwamba Fever Viruses. J. Inf. Dis.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Response of the Syrian Hamsters to Intraocular Exposure and Rectal Instillation to Various Strains of Rabies. J. Trop. Med.

Reagan, R. L., and Brueckner, A. L. Studies by Electron Microscopy of Erythrocytes from Mice Infected with Semliki Forest Virus. *J. Micro. Society.* 

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Comparison by Electron Microscopy of Anopheles "A" and Anopheles "B" Virus. *Texas Medicine*.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Comparison by Electron Microscopy of Bunyamera Virus, Uganda S. Virus, and Ilheus Virus. *Microscopic Society*.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Response of the Swiss Albino Mouse to Bunymera, Wycomycia, Uganda S., Ilheus, Anopheles "A", Anopheles "B", Bwamba, Zika, Ntaya, Yellow Fever, Newcastle Disease Egg Adapted California Strain, Semliki Forest Viruses by Rectal Instillation. Vet. Res.

Reagan, R. L., Strand, Ninalee, and Brueckner, A. L. Studies of the Blood of Hamsters Infected Rectally with Rabies Virus. Cor. Vet.

Reagan, R. L., and Brueckner, A. L. Studies by Electron Microscopy of Erythrocytes from Young Dogs Infected with Rabies Virus.

Reagan, R. L., Palmer, Eddy, and Brueckner, A. L. Electron Microscopic Studies of Erythrocytes from a Patient with Infectious Mononucleosis. J. Pathology.

Reagan, R. L., and Brueckner, A. L. Studies of Hamster-Adapted Newcastle Virus in Hamsters, Baby Chicks, and Chickens after 330 Passages in this species. *Proc. Soc.* 

Reagan, R. L. Study of Poliomyelitis in Erythrocytes. J. Micro.

Reagan, R. L., and Brueckner, A. L. Response of the Swiss Albino Mouse to Infectious Bronchitis. Vet. Research.

Reagan, R. L. and Brueckner, A. L. Studies of Rabies in Hamsters (9 Cont. Strains and 9 Glycerin Strains) Rectally. *Proc. Soc. Exp. Med.* 

Reagan, R. L., and Brueckner, A. L. Response of the Baby Chick to Bronchitis and N. D. Virus Vaccine Prepared in Mineral Oil and Artacal. J. Poultry Science.

Reagan, R. L., Palmer, Eddy, and Brueckner, A. L. Electron Microscope Studies of Erythrocytes in Hodgkins Disease. J. Blood.

Reagan, R. L., and Brueckner, A. L. Electron Microscope Studies of the Virus of the Common Cold after Passage in the Chimpanzee. J. Texas Med.

# XII. Graduate School

This section contains a complete list of dissertations and theses for the following degrees granted in the period July 1, 1952 to June 30, 1953: Doctor of Philosophy, Doctor of Education, Master of Arts, Master of Science, Master of Business Administration, and Master of Foreign Study.

#### Agricultural Economics and Marketing

Dissertation: Comparative Study of Food and Population in Ten Selected Counties and Territories in South and Southeast Asia. Shekata El-Sayed Shekata, Ph.D., 1953.

Thesis: Problems in Rural School Bus Transportation in Maryland. Lloyd Carroll Biser, M.S., 1953.

Thesis: Fire Protection and Prevention Measures on Farms in the Piedmont Section of Maryland. Lynden Chadwick O'Day, M.S., 1953.

Thesis: Loose Leaf Auction Marketing of Maryland Tobacco. Paul Francis Summers, Jr., M.S., 1953.

Thesis: The Bulk Handling System of Marketing Milk in the Washington, D. C. Milk Shed. Carol Ronald Twining, M.S., 1953.

Thesis: Potential Development of the Resources of Lajas Valley. Rene M. Bodia, M.S., 1952.

Thesis: An Economic Analysis of the Pineapple Industry of Puerto Rico. Carlos Jimenez de la Rosa, M.S., 1952.

## Agricultural Education and Rural Life

Thesis: The Development of Vocational Agriculture in Dorchester County, Maryland. Perry Stewart Flegel, M.S., 1953.

Thesis: Education and Progress of Maryland Disabled Veterans in Farming. Roscoe Brown, Jr., M.S., 1953.

Thesis: Project Production Standards for Vocational Agriculture in Maryland. Louis F. Ahalt, M.S., 1952.

Thesis: Technical Skills in Farm Mechanics Requiring a Planned Demonstration for Effective Teaching Needed by Beginning Teachers of Vocational Agriculture in the North Atlantic Region. Harry Thomas Miller, M.S., 1952.

Thesis: Development of the Educational System in Montgomery County, North Carolina. William H. Worley, M.S., 1952.

## Agronomy

Dissertation: Studies of Inheritance, Photoperiodic Response, and Determination of Tannin Content of Lespedeza Cuneata Don. Richard Pierce Bates, Ph.D., 1953.

Thesis: The Effect of Phosphorus Fertilization on the Content of Phosphorus, Magnesium, Calcium and Potassium in Air Cured Maryland Tobacco. Thomas Leonard Cryer, Jr., M.S., 1953.

Thesis: A Survey of the Relationship of Cultural Practices to Quality of Maryland Tobacco. George L. Steffens, M.S., 1953.

Dissertation: Micrometeorological Investigations in Relation to Forage Crop Production in Maryland. A. Morris Decker, Jr., Ph.D., 1953.

Dissertation. Behavior of Alkaloids in Three Successive Generations of Selected Disease Resistant Maryland Tobacco Lines. Jose R. Mondonedo, Ph.D., 1953.

Thesis: The Nitrogen Components of Strains and Hybrids of Maryland Tobacco. Jamal Abdul-Karim Fuod, M.S., 1953.

Thesis: Yield and Chemical Composition of Alfalfa as Influenced by Different Fertilizer Treatments. James Ronald Miller, M.S., 1953.

Thesis: A Field Study of Rates and Dates of Applying Certain Chemicals for Control of Chickweed in Alfalfa. Lindsay Franklin Morris, M.S., 1953.

Thesis: The Relationship between Rates of Phosphorous for Maryland Tobacco and the Nitrogen Composition of the Plant. Hendrina Anna de Hondt, M.S., 1953.

#### American Civilization

Dissertation: The American Struggle for International Copyright, 1866-1891. Warren Benjamin Bezanson, Ph.D., 1953.

Thesis: Anna Cora Mowatt and Her Audience. Imogene J. McCarthy, M.A., 1953.

### Bacteriology

Dissertation: Salt Desideratum of Vibrio Costicolus, an Obligate Halophlic Bacterium. William Louis Flannery, Ph.D., 1953.

Dissertation: Study of the Bacterial Utilization of Amines. Ralph Andrew Slepecky, Ph.D., 1953.

Thesis: Growth Requirements of Neisseria Gonorrhoeae. Charles Wesley Griffin, III, M.S., 1953.

Thesis: Studies of the Influence of Divalent Cation upon Standardization of the Complement-Fixation Procedure. David F. Kefauver, M.S., 1953.

Thesis: The Isolation and Identification of *Lactobacillus Bifidus* from the Cecal Feces of Chickens. Robert Elmer McCarthy, M.S., 1953.

Thesis: The Nutritional Requirements of Bacteria from the Bovine Rumen. John Joseph McNeill, M.S., 1953.

Dissertation: The Status of the Genus Erysipelothrix. George Curtis Langford, Jr., Ph.D., 1953.

Thesis: A Study of the Purine Metabolism of a Chloramphenicol Resistant Strain of *Micrrococcus pyrogenes* var. aureus. Richard Emery Brown, M.S., 1952.

## Botany

Dissertation: Pathology and Biology of *Ditylenchus* Sp. in Relation to a Disease of Agaricus Campetris L. Eldon James Cairns, Ph.D., 1953.

Dissertation: Compatibility and Embryological Studies of Species Crosses in the Azaleas. John Lewis Creech, Ph.D., 1953.

Dissertation: Studies in the Starch-Sugar Equilibrium in Potato Tubers. Charles Corbin Craft, Ph.D., 1953.

Dissertation: The Effect of Tetramethylthiuram Disulfide on the Anaerobic Breakdown of Glucose by yeast. Hugh Delane Sisler, Ph.D., 1953.

Thesis: The Effect of Moisture Loss on the Ascorbic Acid Content of Broccoli (Brossica oleracea Var. Italica). John Cornelius Hansen, M.S., 1953.

Thesis: Retention of Virulence of *Pseudomonas Caryophylli* Burkh. in Culture. Roger Amos Milstrey, M.S., 1953.

Thesis. A Karyotypic Analysis of Eleven Haemanthus Species and Varieties. Donald Francis Wetherell, M.S., 1953.

Dissertation: Nutrition of Lima Bean *Phaseolus Lunatus* L. in Relation to Disease Development Incited by a Root-Knot Nematode *Meloidogyne Incognita* and to Development of the Pathogen. Bakir Abbas Oteifa, Ph.D., 1953.

Dissertation: Studies on Identification and Host-Parasite Relationships of the Common Root-Knot Nematodes (Meloidogyne Spp.) with Special Reference to Maryland. Joseph Neal Sasser, Ph.D., 1953.

Thesis: Variations Among Some Isolates of *Rhizoctonia solani* Kuhn. Medhat H. K. Rushdi, M.S., 1953.

Dissertation: The Effect of Reduced Oxygen Levels on Respiration, The Production of Volatiles, and the Keeping Quality of Broccoli. Morris Lieberman, Ph.D., 1952.

#### Business Administration

Thesis: The Amortization of Emergency Facilities. Robert Lee Gable, M.B.A., 1953.

Thesis: The Pros and Cons of User Charges on the Inland Waterways. Roger Kyre Lausch, M.B.A., 1953.

Thesis: The Development of Commercial Air Transportation in China. Ching-Lang Tsing, M.B.A., 1953.

Thesis: A Study of the Development of Maritime Traffic in China. Chung Shan Chow, M.B.A., 1953.

Thesis: Collective Bargaining Developments Since the Korean Conflict. David Roy Falke, M.B.A., 1953.

Thesis: The Control of Customer Returns in Department Stores. Edwin G. Levy, M.B.A., 1952.

Thesis: A Survey of Selected Credit Policies and Procedures in Three Baltimore Department Stores. Maurice Alfred Levy, M.B.A., 1952.

Thesis: Executive Leadership in Industry. Donald L. Richard, M.B.A., 1952.

Thesis: Rating Stop-Watch Time Studies. Joseph W. Wilson, M.B.A., 1952.

## Chemical Engineering

Dissertation: A Study of Some of the Thermal Changes Involved in Coal Carbonization and the Effect of Chemical Pretreatment on These Thermal Changes and upon Coke Structure. Richard Smouse Fey, Ph.D., 1953.

Thesis: Grain Refinement in the Aluminum Alloys. Harold Bernstein, M.S., 1953.

Thesis: Properties of Ductile Titanium. Joseph H. Bilbrey, Jr., M.S., 1953.

Thesis: The Application of Physical Metallurgy to the Solution of Problems in Specifications and Transportation Equipment Failures. Harold Hessing, M.S., 1953.

Thesis: The Influence of Heat-Treating Variables on the Martensite Transformation in SAE 1050 Steel. Melvin R. Meyerson, M.S., 1953.

#### Chemistry

Dissertation: The Synthesis of an Open-Chain Analogue of Podophyllotoxin. William B. Tuemmler, Ph.D., 1953.

Thesis: Studies in 1, 3, 5-Hexatriene Synthesis. Daniel E. Duggan, M.S., 1953.

Thesis: The Reaction of Dibenzoylmethane with Grignard Reagents. Reuben Proper, M.S., 1953.

Dissertations: Synthetic Poliomyeliticidals. Douglas N. Christensen, Ph.D., 1953.

Dissertations: The Enzymatic Hydrolysis of Nitrogen Dioxide. Charles E. Feazel, Jr., Ph.D., 1953.

Dissertations: Quercetin as a Colorimetric Reagent for Zirconium. Frank S. Grimaldi, Ph.D., 1953.

Dissertations: Studies in Synthetic Analgesics. Shirley M. Grenell, Ph.D., 1953.

Dissertations: Fractionation and Concentration of Growth Factors for *Lactobacillus Bulgaricus* 09 and *Lactobacillus Lactis* 8000. Kung Ying Tang Kao, Ph.D., 1953.

Thesis: Derivatives of 8-Nitroquinoline. Douglas N. Christensen, M.S., 1953.

Thesis: The Condensation of Benzaldehyde and Chloroform. Charles D. Dulin, M.S., 1953.

Thesis: A Synthesis of B-Phenylpropiophenones. Allen P. Evans, M.S., 1953.

Thesis: A study of the Inhibition of Monoamine Oxidase. Robert B. McComb, M.S., 1953.

Thesis: Possible Routes for Synthesizing Peptides of dl-B-(3, 4-Dihydroxyphenyl). John J. O'Neill, M.S., 1953.

Thesis: Studies of the Preparation of Intermediates in the Synthesis of 2,6,7-Trimethylbicyclo (2.2.2) Octane-1-Carboxylic Acid. Charles H. Rolston, M.S., 1953.

Thesis: The Absence of Quaternary Salt Formation between Phosphoryl Chloride and Pyridine. Bernard M. Zeffert, M.S., 1953.

Thesis: A Study of the Reactivity of Certain Phenacyl Chlorides with Iodide Ion. Thomas E. Kaiser, M.S., 1953.

Thesis: The X-Ray Crystallography of Yohimbine Hydrochloride and Yohimbine Hydrobromide. Gordon Burley, M.S., 1952.

Thesis: The Photopotential Behavior of Organic Halides and Alcohol. M. Bruce Bush, M.S., 1952.

## Civil Engineering

Thesis: Design of a Proposed Prestressed Concrete Footbridge. William W. Payne, M.S., 1953.

Thesis: A Photogrammetric Membrane Analogy Study of the Torsional Stresses Developed in Angle Sections of Various Leg-to-Leg Ratios. Herbert W. Harden, M.S., 1953.

#### Dairy

Dissertation: Studies on the Perfusion of Bovine Mammary Gland. Soma Kumar, Ph.D., 1953.

Thesis: Off Flavors in Milk on the Farm. Vir Viranjan Singh Tyagi, M.S., 1953.

Dissertation: Blood Sugar, Acetone Bodies, and Liver Glycogen of Dairy Cows under Various Physiological Conditions during the Parturient Period. Emory C. Leffel, Ph.D., 1953.

Thesis I: Prepartum and Postpartum Study on Eosinophils in Dairy Cattle.

II: Epinephin Test for Anterior Pituitary Adrenocortical Integrity. Wali Mohammed Gill, M.S., 1953.

#### Economics

Thesis. A Study of John Maynard Keynes' Theory of a Monetary Economy. Georgene I. Schreiner, M.A., 1953.

#### Education

Dissertation: An Analysis of the Reactions of Teachers to a Program of Child Study. Alton C. Murphy, Ed.D., 1953.

Thesis: The Determination of Significant Implications of the University of Maryland Prenursing Program. Mildred H. Cohen, M.A., 1953.

Thesis: A Study of Some Factors Affecting Adjustment to Boys' Camp. William M. Hammerman, M.A., 1953.

Thesis: An Evaluation of an adult Counseling Service Provided by the Baltimore Department of Education. Gordon E. Medinger, M.A., 1953.

Thesis: A Follow-Up Study of the Graduates of the University of Maryland School of Nursing, 1945-1950. Virginia C. Conley, M.A., 1953.

Thesis: A Study of the Developmental Tasks of Evangelical Christian Adolescents, with Implications for Education. George C. Doepp, M.A., 1953.

Thesis: An Evaluation of a Flexible Reading Program in the Intermediate Grades. Evan F. Bowers, M.A., 1952.

Thesis: Method for Brass Instruments. Morley D. Hoffman, M.A., 1952.

Thesis: Student Retention in one Public Secondary School: A Study of the Selected In-School and Out-of-School Factors Associated with Retention. Carl H. Hough, M.A., 1952.

Thesis: Some Factors Involved in the Non-Reenrollment of First Year 4-H Club Boys in Baltimore, Harford, Howard and Montgomery Counties, Maryland. Merle L. Howes, M.A., 1952.

Thesis: A Study of the Relationship Between Childrens Feelings of Adequacy or Inadequacy in Their Relation with Others and Their Academic Achievement. Marion Rockwood, M.A., 1952.

Thesis: Education in Chancer's Time. Virginia K. Stanton, M.A., 1952.

Thesis: Improving Dietary Practices of Children Through A School Oriented Nutrition Program. Josephine D. West, M.A., 1952.

#### Foreign Languages

Dissertation: Repertoire des Themes d'Alfred de Vigny. Simone F. Fagg, Ph.D., 1953.

Thesis: A Study of the Life and Writings of Carlos Loveira. Albert N. Cole, M.A., 1953.

Thesis: Visages de Femmes dans la Chronique des Pasquier. Henri de Marne, M.A., 1953.

Thesis: The Families of Male Characters in Curel's Dramas. Ewin P. Davis, M.A., 1953.

Thesis: Bourdalone Jesuit Preacher and Traditionalist of the Seventeenth Century. William D. Morgan, M.F.S., 1953.

Thesis: Le Role de la Musique dans la Chronique des Pasquier de Georges Duhamel. Edward B. Hamer, Jr., M.F.S., 1953.

Thesis: Autobiographical Elements in the Prose of Theodor Sterm. Clifford A. Bernd, M.F.S., 1952.

Thesis: Andreas Heusler und das Germanentum. Edna J. Llewllyn, M.F.S., 1952.

#### Geography

Dissertation: The Lands Along the Upper St. Lawrence: Canadian-American Development During the Nineteenth Century. William A. Douglas Jackson, Ph.D., 1953.

Thesis: An Agricultural Land-Use Study of Western Montgomery County, Maryland. Irving B. Kelley, M.A., 1953.

Thesis: An Evolution of Land Use in Kent County, Maryland. Carey B. Singleton, Jr., M.A., 1953.

Thesis: A Preliminary Geographic Study of the Village of Kiunga, Kenya (A Study in Semi-Arid, Tropical Coastal Settlement). Walter W. Deshler, M.A., 1953.

Dissertation: Trends in Land Use in Southeast Puerto Rico. George A. Beishlag, Ph.D., 1953.

Dissertation: The Geography of the Pineapple Industry of Puerto Rico. William W. Burchfiel, Jr., Ph.D., 1953.

Dissertation: A Geographical Analysis of Washington County, Maryland, and Its Fruit Industry. Mohammod Hamid Alta'i, Ph.D., 1953.

#### Government and Politics

Dissertation: The Federal Government in the American Novel, 1900-1950. Genevieve C. Linebarger, Ph.D., 1953.

Thesis: The Anglo-Iranian Oil Controversy, Its Background and Development. Bahman Amini, M.A., 1953.

Thesis: From Militia to Reserve: Federal Regulation of the National Guard, 1903 to 1933. James C. Grant, Jr., M.A., 1953.

Thesis: The Military Role in the Formulation and Implementation of National Policy: North Atlantic Treaty Organization (NATO). John C. Pitchford, M.A., 1953.

Thesis: Legislative Liaison of the Department of Defense with Congress (September 17, 1947-January 26, 1953). C. Herschel Schooley, M.A., 1953.

#### Electrical Engineering

Thesis: Microwave Diffraction Patterns in the Apertures of Electromagnetic Horns. John C. Cacheris, M.S., 1953.

Thesis: A Study of the Stabiline 1E5101R Regulator. Morris Gisser, M.S., 1953.

Thesis: A 300 MC Noise Comparator. Irving W. Hammer, M.S., 1953. Thesis: Harmonic Generation by Silicon Crystals at Microwave Frequencies. Ying-Chen Hwang, M.S., 1953.

Thesis: Noise from the Plasma of a Gaseous Discharge. Roger C. Jones, M.S., 1953.

Thesis: Determination of the Conditions for Maximum Recordable Oscilloscopic Writing Speed. Harold J. Peake, M.S., 1953.

Thesis: A System for Precise Frequency Control of a One-Hundred Kilocycle Oscillator by Means of a Quartz-Crystal Resonator. Thomas A. Pendleton, M.S., 1953.

Thesis: A Method of Using a Tuned System for the Enhancement of Transient Signals with a Damped Sinusoidal Waveshape. John C. Munson, M.S., 1952.

Thesis: An Extremely Excited Electronic Switch for Producing Variable Width, Variable Repetition Rate Rectangular Pulses. Jack Sargent, M.S., 1952.

Thesis: Radiant Energy Meter for the Measurement of Short Time Light Pulses. Leon Scharff, M.S., 1952.

#### English

Dissertation: A Study of Dickens' Imagery. Ruth R. Adams, Ph.D., 1953.

Dissertation: American Periodical Criticism of Mark Twain, 1869-1917. Durant da Ponte, Ph.D., 1953.

Thesis: John Donne and the Law. William E. Stahr, M.A., 1953.

Dissertation: Henry James' Revisions of His Early Short Stories and Short Novels. Robert A. Elderdice, Ph.D., 1953.

Dissertation: A Biography of Lydia Maria Child. Berenice G. Lamberton, Ph.D., 1953.

Thesis: The Critics on Mark Twain's Pessimism: 1900-1947. Janet Wexler, M.A., 1953.

Dissertation: John Sullivan Dwight: Transcendentalist and Literary Amateur of Music. Walter L. Fertig, Ph.D., 1952.

## Entomology

Dissertation: A Study of the Ixodid Ticks of Northern Florida, Including the Biology and Life History of *Ixodes scapularis* Say (Ixodidae: Acarina). Andrew J. Rogers, Ph.D., 1953.

Thesis: The Biology and Control of Aceria Orchidarum Atcheson and Keifer. Walter C. Atcheson, M.S., 1953.

Thesis: A Revision of the Genus Dendrocoris and Its Generic Relationships. Gayle H. Nelson, M.S., 1953.

Thesis: Life History Facts and Control of the Brown Dog Tick (Rhipicephalus Sanguineus Latr.). Charles G. Wright, M.S., 1953.

Thesis: The Biology of the Omnivorous Mite Brevipalpus Australis (Tucker) (Acarina: Phytoptipalpidae). George R. Manglitz, M.S., 1952.

Thesis: Military Justice and the United States Court of Military Appeals. Charles E. Wainwright, M.A., 1953.

Dissertation: The Role of the National Party Chairman from Hanna to Farley. Marie Chatham, Ph.D., 1953.

Thesis: Recent International Plebiscites. Arthur Siegel, M.A.,1953.

Thesis: The Chinese Communist Movement. Yung Ping Chen, M.A., 1953.

Thesis: Political Institutions in Micronesia. Dorothy H. Block, M.A., 1953.

Dissertation: The Personnel System of the Foreign Service of the United States. Martin M. Moser, Ph.D., 1952.

Thesis: Technical and Financial Assistance to Underdeveloped Areas. Daniel Fendrick, M.A., 1952.

#### History

The Development of Pennsylvania's Little New Deal. John R. McCool, M.A., 1953.

Thesis: A Critical Analysis of the Schuman Plan: The European Coal-Steel Community. Kathleen B. Srour, M.A., 1953.

Thesis: The Atlantic and Arcadia Conferences: The First Two Wartime Meetings of Roosevelt and Churchill. Russell P. Strange, M.A., 1953.

Thesis: The United States and the Displaced Persons of Central Europe; the Development of a Policy, 1938-1947. Alexis von Bretzel, M.A., 1953.

Thesis: The Political Career of Henry T. Rainey, 1903-1934. Marshall E. Baker, M.A., 1953.

Dissertation: The CIO's Role in American Politics, 1936-1948. Delbert D. Arnold, Ph.D., 1952.

Thesis: The Baltimore Business Community and the Secession Crisis, 1860-1861. William B. Catton, M.A., 1952.

#### Home Economics

Thesis: Iron Balance Study in a Protein Metabolism Experiment with Fish and Meat. -Camille J. Dorn, M.S., 1953.

Thesis: Protein Utilization of Beef and Haddock by Normal College Women: A Six Day Repetitive Diet Study for the Protein Utilization of Individual Meals. Helen J. MacMillan, M.S., 1953.

Thesis: The Loss in Vitamin "C" Content of 247 Vegetables Cooked in Three Types of Containers under Varied Conditions. Saad Ahmed Massoud, M.S., 1953.

Thesis: A Study of Wardrobes of the Freshmen Women Attending the University of Maryland (1951-52) with an Investigation of Certain Factors Influencing the Acquisition of These Wardrobes. Mary S. Schur, M.S., 1953.

Thesis: The Origin and Evolution of the Philippine National Costume. Josefina G. Sevilla, M.S., 1953.

#### Horticulture

Dissertation: The Effect of Calcium, Magnesium, and Potassium on

the Growth of Strawberry Plant in Sand Culture. Albert A. Piringer, Jr., Ph.D., 1953.

Thesis: A Study of the Use of Certain Fungicides as a Means of Controlling Bacterial Wilt of Carnations Caused by *Pseudomonas Caryophylli* Burkh. Albin D. Lengyel, M.S., 1953.

#### Mathematics

Dissertation: Chromatic Polynomials of Large Maps. Joseph W. Siry, Ph.D., 1953.

Thesis: Flow Problems for Ring-Shaped Bodies. George Weiss, M.A., 1953.

#### Mechanical Engineering

Dissertation: Vibrations of a Two Span Symmetrical Beam with an Elastic Midsupport under the Action of a Constant, Uniformly Moving Force. Irving H. Shames, Ph.D., 1953.

Thesis: A Problem in Packaging Design. Howard C. Filbert, Jr., M.S., 1953.

Thesis: The Dyanamic Response of a Two Component Balance to an Arbitrary Periodic Force and Moment on a Towed Body. Paul Golovato, M.S., 1953.

Thesis: Shear Log in a Tensile Plate with Constrained End under Symmetrical Loading. Leonard Hardis, M.S., 1953.

Thesis: Analysis of Coolant and Metal Surface Temperatures in a Simplified Nuclear Reactor. Jerome Jacobson, M.S., 1953.

Thesis: An Apparatus for Investigating the Characteristics of Vaporizing Flow in a Capillary Tube. William W. Thomas, M.S., 1953.

Thesis: The Deflections of a Gear Drive for a High-Performance Radar Antenna Mount. James W. Titus, M.S., 1953.

Thesis: An Investigation of Damages Resulting from Laboratory Vibration and High Shock Tests. Kenneth E. Woodward, M.S., 1953.

Thesis: An Analytical Method for the Determination of the Basic Longitudinal Stability Characteristics of a Conventional Single-Lifting-Rotor Helicopter. John W. Mazur, M.S., 1953.

Thesis: The Calculation of the Performance of Fixed Geometry Ram Jet Engines. Merwin Sibulkin, M.S., 1953.

Thesis: The Uniflow Vortex Tube. Roy C. MacGee, Jr., M.S., 1952.

#### School of Medicine

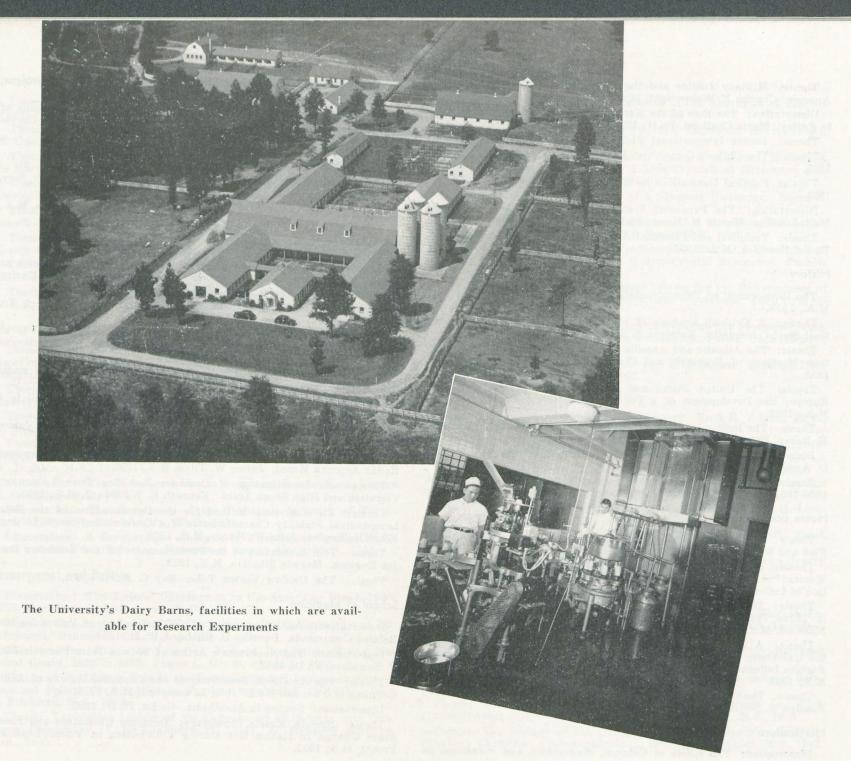
Dissertation: An Investigation of the Metabolism of Putrescine and Related Compounds. Dorothy D. Hubbard, Ph.D., 1953.

Dissertation: The Nephrotoxic Action of Sodium Tetrathionate. Jack P. Saunders, Ph.D., 1953.

Thesis: The Antibiotic Sensitivity of the Causative Agents of Acute Cellulitis of Face and Neck. John L. Campbell, M.S., 1953.

Dissertation: Studies in Anesthesia. Go Lu, Ph.D., 1952.

Thesis: Smooth Muscle Physiology: Dextrose Utilization and Phosphate Change in Rabbit Gut During Contraction in Vitro. Leah M. Proutt, M.S., 1952.



#### School of Pharmacy

Dissertation: Studies on the Mechanism of the Loss of Chloramphenicol Resistance in *Escherichia coli*. Ernest C. Herrmann, Ph.D., 1953.

Dissertation: The Effect of Various Antibiotics and Cortisone upon Microbial Toxis. Merrill J. Snyder, Ph.D., 1953.

Thesis: Bifunctional Analogs of Pharmacologically Active Imidazolines and Related Theophyllines. Carl Kaiser, M.S., 1953.

Thesis: Stability of Para-Aminosalicylic Acid in Aqueous Solution. Charles J. Kokoski, M.S., 1953.

Thesis: Charges for Medications in Hospitals and a Rational System for Their Determination. Albert W. Kossler, M.S., 1953.

Thesis: A Comparative of Disintegrating Agents in Water-Soluble Suppository Bases. Robert E. Lawson, M.S., 1953.

Thesis: In Vivo pH Determinations of Carious Lesions. Ernest C. Merkel, Jr., M.S., 1953.

Thesis: Fluorenyl and Fluorenylidine Derivatives Related to 2-Benzyl, 2-imidazoline and 8-Benzyltheophylline. Bernard Misek, M.S., 1953.

Dissertation: A Study of the Stability of Cyanocobalamin and Ascorbic Acid in Liquid Formulations. Andrew Bartilucci, Ph.D., 1953.

Thesis: The Anti-Adrenolytic Action of Ergotoxine. John R. Stotts, M.S., 1953.

Dissertation: Synthetic Theophylline Derivatives for Use in Hypertensive Studies—II. John B. Harmon, Ph.D., 1952.

Thesis: A Study of the Methods of Assay for Phenobarbital in Polyethylene Glycol 400 Solution. John Autian, M.S., 1952.

Thesis: Essential Oil Solubilization with Polysorbate 80. Armand P. Poitras, M.S., 1952.

## Physical Education

Thesis: A Comparison of Two Physiological Indices of Emotional Reactions of High School Girls to Girls' Competitive Basketball. Mary F. Maxey, M.A., 1953.

Thesis: The Effect of Music as a Teaching Aid in Intermediate Swimming Classes for College Women. Doris M. Neyendorf, M.A., 1953.

Thesis: A Study of the Rating Centers for Riding Instructors Sponsored by the National Section on Women's Athletics. Ann J. Fennessey, M.A., 1953.

Thesis: A Study of the Most Apparent Weaknesses of High School Basketball Players Entering College. William C. Gardiner, M.A., 1952.

Thesis: An Annotated Bibliography of All Articles and Books Published and Available in the United States since January 1939 through December 1951 which Have as Their Major Theme, Swimming and Small Craft. Eleanor L. Wright, M.A., 1952.

## **Physics**

Dissertation: Precision Determination of Photoneutron Thresholds. Milton Birnbaum, Ph.D., 1953.

Thesis: Heat Capacity, Enthalpy, Free Energy, and Entropy of

Series of Diatomic Fluorides for the "Ideal" Gas State Calculated Statistically from Molecular Data. Lester Haar, M.S., 1953.

Thesis: The Duration of Neon Metastable  $^{3}P_{2}$  Level as a Function of Temperature. Moe I. Schneebaum, M.S., 1953.

Thesis: An Application of Electron Microscopy to the Freeze-Drying of Proteins. Sydney S. Breese, Jr., M.S., 1953.

Thesis: Dielectric Losses and Relaxation Effects in Sodium Chloride Crystals Containing Small Amounts of Cadmium. David Redfield, M.S., 1953.

Thesis: Magnetic Properties of a Hollow Superconducting Lead Sphere. Julius Babiskin, M.S., 1952.

Thesis: Spectrographic Determination of Low Concentrations of Argon in Neon. Kyonghi Hong, M.S., 1952.

Thesis: The Design and Construction of an Apparatus to Measure the Work Function of Geiger Tube Cathodes. Herbert Malamud, M.S., 1952.

Thesis: Penetration in Pb of Gamma-Radiation from a Co<sup>®</sup> Source. Samuel Olanoff, M.S., 1952.

Thesis: Temperature Dependence of the Fluorescence of Several Xylene Solutions. Robert B. Shearer, M.S., 1952.

#### Poultry

Dissertation: Effects of Thyroxine, Sex Hormones, and Stress on Hormonal Interactions as Measured by Gland and Organ Weights, Metabolic Rate, Resistance to Exhaustion and Adrenal Histology of New Hampshire Chicks. Mark H. Conner, Ph.D., 1953.

Dissertation: The Effect of Antibiotics Alone and with Various Diluents and Hormones upon the In Vitro Survival and Fertilizing Capacity of Chicken Semen. Shahid Husain Qureshi, Ph.D., 1953.

Dissertation: Inheritance of Thyroid Response to Thiouracil Feeding in New Hampshire Chickens and Its Relationship to Some Economic Characteristics. William E. Shaklee, Ph.D., 1953.

Thesis: The Role of Various Diluents and Physical Factors Influencing the Physiology of Fowl Semen. Philip D. Bogdonoff, Jr., M.S., 1953.

Thesis: The Heritability of Body Weight in Turkeys. Harvey L. Bumgardner, M.S., 1953.

Thesis: A Study of the Physiological Mechanisms Affecting Specific Gravity of Chicken Eggs. Adriano R. Gabuten, M.S., 1953.

Dissertation: An Investigation of the Morphological Changes, Hormonal Influences, and Genetic Factors Concerned in the Response of Young Chickens to Conditions of Stress. Henry W. Garren, Ph.D., 1953.

Thesis: Evidence for Genetic Resistance to High Environmental Temperature in Day-Old Chickens. Mahmoud A. Kheir El Din, M.S., 1952.

## Psychology

Dissertation: Multidimensional Psychophysics and Verbal Associations. William S. Ray, Ph.D., 1953.

Thesis: An Exploratory Investigation of the Relationship between Variability of High School Grades and College Achievement. Homer R. Figler, M.A., 1953.



The Study of Children
Constitutes one of the
University's Chief
Fields of Research

Thesis: An Exploratory Investigation in the Use of Self-Paced Tests as Indicators of Behavior Decrement. Leon T. Ketchmar, M.S., 1953.

Thesis: An Investigation of Three Variables Affecting Verbal Response Availability. Reuben N. Shevitz, M.A., 1953.

Thesis: An Exploratory Investigation of the Relationship of Perceptual Organization and General Systemic Fatigue. William A. Lybrand M.S., 1952.

Thesis: A Study of the Comparisons Among Self-Ratings, Ratings by Associates and Self Estimates of Ratings by Associates. Edna B. Stark, M.A., 1952.

#### Sociology

Thesis: Parential Role—Conception and Child Care Practices in Families of Working Mothers. Jean K. Szaloczi, M.A., 1953.

Thesis: Content Analysis of the Newspaper Editorial Cartoon as Influenced by the Korean War. John D. Stevens, M.A., 1953.

Thesis: Urbanization in the Union of South Africa: Its Effect upon the Bantu. Eustace L. Tarr, M.A., 1953.

Thesis: The Rural Family in Prince Georges County. Gail F. Fisher, M.A., 1952.

Thesis: Negro Family Aspiration—Levels in an Urban Area (An Exploratory Analysis of Family Motivations). Parren J. Mitchell, M.A., 1952.

Thesis: A Comparison of Eighty Delinquent Boys With Eighty Non-Delinquent Boys Concerning Their Participation In Organized Recreational Facilities. H. Colman Rosenthal, M.A., 1952.

## Speech

Thesis: An Investigation of the Relationship between Noise and Speech When Presented at Supra-Threshold Levels as Pertains to the Doerfler-Stewart Test for Malingering and Psychogenic Deafness. Harriet T. Campbell, M.A., 1953.

Thesis: The Comparative Reliability of the Central Institute for the Deaf Disc Recorded and Monitored Line Voice Auditory Test W-22 (Phonetically Balanced Word List). Ann Marie M. Brandt, M.A., 1953.

Thesis: A Simulated Normal Conversation Test of Hearing Applied to Pure and Predominantly Perceptive Hearing Losses. Joyce L. Marmelstein, M.A., 1953.

## Zoology

Dissertation: Introductory Study of the Effect of Enheptin (2-Amino, 5 Nitrothiazole) on the Host-Parasite Relationship in Blackhead. Francis G. Tromba, Ph.D., 1953.

Dissertation: An Investigation into the Interrelations of Ovulation in *Rana clamitans* and *Rana pipiens* as Induced by Interspecific Injections of Pituitary Glands. John G. Barker, M.S., 1953.

Thesis: Observations on the Rate of Growth of the Hard Clam, Venus mercenaria mercenaria (L), in the Lower Pocomoke Sound. Robert H. Clark, M.S., 1953.

Thesis: The Changes in the Blood and Tissue Chemistry in Rats Following Training. Lewis A. Dalburg, Jr., M.S., 1953.

Thesis: Studies on the Specific Gravities of Animal Tissues. Bertrand S. Dann, M.S., 1953.

Thesis: Observations on the Copper and Manganese Content in the Oyster, Crassostrea virginica (Gmelin), in the Upper Chesapeake Bay. Kenneth M. Downes, M.S., 1953.

Thesis: Observations on the Inshore Distribution, Seasonal Abundance, and Biology of Shrimp in the Chesapeake Bay with Particular Reference to Genus *Palaemonetes*. Jack L. Marriott, M.S., 1953.

Thesis: A Study of the Effects of Colchicine and Paradichlorobenzene on Mitosis in the Liver of the Young Rat. Harold E. Muma, M.S., 1953.

Thesis: An Investigation of the Inshore Population of the Spot (*Leiostomus xanthurus*, Lacepede) with Particular Reference to Seasonal Growth and Size Distribution in Chesapeake Bay. Robert H. Young, M.S., 1953.

Dissertation: A Study of Oxygen Debt in the Albino Rat: The Influence of Training on the Distribution of Phosphates and Other Chemical Components of the Blood Muscle of Rats. Sidney Grollman, Ph.D., 1952.



SCHOOL OF PHARMACY
(University of Maryland, Baltimore)
Organized 1840.

## UNIVERSITY OF MARYLAND

Statement	of Disbursements from the Endowment Fund Income and	d
	from Separately Budgeted Funds of the University	
	For the Fiscal Year Ended June 30, 1953	

For the Fiscal Year Ended June 30, 1953	
From Endowment Funds:	
College Park:	
Goddard Fund	\$ 94.30
Land Grant Fund	3,310.00
Dinah Berman Memorial Fund	17.60
James and Sarah E. R. Goddard Memorial Fund	23.70
School of Law:	
Elizabeth Maxwell Carroll Chestnut Fund	29.00
School of Medicine:	
Bressler Reserve Funds	29,509.94
Isaac E. Emerson Fellowship	1,183.26
J. M. H. Rowland Library Fund	116.80
John F. B. Weaver Fellowship	2,299.98
Charles M. Hitchcock Fellowship	1,500.00
Henry Rolando Scholarship	250.00
William D. Wolfe Fund	100.00
Clarence and Genevra Warfield Scholarship	1,200.00
Neuro-Surgery Research	928.12
Leonard W. Hummell Memorial	25.00
Horace Bruce Hetrick Scholarship	1,000.00
Charles M. Hitchcock Scholarship	200.00
Leo Karlinsky Scholarship	250.00
Randolph Winslow Scholarship	200.00
A. Bradley Gaither Memorial	25.00
Rh Typing Laboratory	4,500.00
Julius Friedenwald Lecture Fund	281.06
School of Nursing:	
E. and L. M. Zimmerman Prize	50.00
Elizabeth Collins Lee Prize	50.00
William Tarun Nurses Training School Prize	25.00
School of Pharmacy:	
Isaac E. Emerson Fellowship	4,275.00
William Practical Pharmacy Prize	25.00
William Simon Memorial Prize	40.00
Conrad L. Wich Prize	15.00
Total Endowment Fund	\$ 51,523.76
From Separately Budgeted Funds	
Institute for Fluid Dynamics and Applied Mathematics	\$105,430.00
Institute for Child Study	34,615.00
Bureau of Business and Economic Research	33,503.00
Bureau of Governmental Research	12,469.00
Chesapeake Bay Research Project	4,000.00
School of Medicine	8,910.00

## Statement of Disbursements from Restricted Contracts for Research For the Fiscal Year Ended June 30, 1953

Educational Departments, College Park: College of Engineering:	
Nonr 594 (0) W18-108-QM-1335	\$ 18,296.59
OAR AF-33 (038) 10481	19.45
N7onr-39705	26,796.40
N7onr-39707	14,054.67
DA 18-108-CML-684	
Housing and Home Finance—H-63	
NOAS 51-847C	3,777.28
OAR-AF-18(600)86	31,607.01
Bureau of Public Roads	12,265.35
DA 18-108-CML-3553	20,176.32
Nonr 879 (00)	1,648.10
OAR-AF-18 (600) -428 DA 44-009-ENG-1671	9,465.61
DA 44-009-ENG-1071	3,020.18
Total College of Engineering	\$141,126.96
Wind Tunnel	96,523.28
College of Arts and Sciences:	
Chemistry N7onr—397-4	1,123.86
Chemistry Nord 10330	16,877.38
Chemistry—Research Corporation	101 05
Psychology N7onr—397-3	131.25
Zoology N6ori—147-1	700.00
Chemistry—Childrens Hospital Research Bacteriology—National Academy of Science	700.00
Bacteriology—National Academy of Science	3,300.87 $4,999.92$
Physics NObsr—49066	39,048.76
Psychology DA 44-109 QM-129	00,040.10
Chemistry—Research Corporation	
Chemistry—Refrigeration Research Foundation	
Chemistry—Eli Lilly Company	62.27
Medicine—DA-49-007-MD-77	20,160.96
Bacteriology Nonr 152(00)	758.47
Bacteriology U.S.P.H. E-89(C)	28.22
Bacteriology DA18-064-CML-478	
Chemistry DA 44-109-QM-389	
Chemistry—U.S.P.H. RG-C430 (C4)	44.550.00
Psychology DA 49-007-MD-222	14,579.82
Chemistry Nonr 595 (01)	12,739.45
Bacteriology—Bio-Ramodrug Company	1 0 10 00
Physics Nonr 602(00)	4,248.22
Zoology Nonr 648(00)	791.43
Chemistry—Carnegie Institute, Project C	600.00
Chemistry Nonr 595 (02)	101,435.45
Bacteriology—National Science Foundation—NSFG-40	4,480.12
Chemistry DA-44-109-QM-994	12,182.61
Bacteriology DA-49-007-MD-294	3,328.75

\$198,927.00

Bacteriology DA-18-064-CML-2107	17,089.42	Special Funds	
Mathematics DA-36-934-ORD-966	8,043.88		0191 000 74
Chemistry—Research Corporation		Farm Sales and Fees	\$131,220.74 9,244.81
Psychology DA-49-083-OSA-519	2,833.77	Regulatory Funds	6,004.70
Sociology SCC-21419	2,294.13	Revolving Funds	0,004.10
Chemistry U.S.P.H. RG-C430(C5)	3,439.75	Total Special Funds	\$146,470,25
Zoology—Sport Fishing Institute	38.23	Total Special Lunds	40,0
Chemistry DA-36-034-ORD-1176	1,489.55	Restricted Contracts for Research	
Chemistry—Abbott Laboratories	100.00 975.00		
Bacteriology—DA-18-064-CML-2380	300.00	Association of Maryland Distillers	\$ 671.54
Bacteriology—National Science Foundation	40.88	Chilean Nitrate	
Psychology Nonr-1225-51003		National Lime Association	
Total College of Arts and Sciences	\$278,222.42	National Slag Association	190.96
		Donaldson Brown	420.26
College of Education:		Maryland Distillers Feeding Project	80.27
Institute for Child Study—Grant Foundation	40,028.15	American Cyanamid Corporation	836.55
Institute for Child Study—Rockefeller Foundation	500.00	Mary Juhn Research Fund	44.19
Institute for Inter American Affairs	6,544.62	Battelle Memorial Institute	44.10
	A 45 050 55	Crab Meal Research Association	35.45
Total College of Education	\$ 47,072.77	Atomic Energy Commission AT(30-1)881	10,378.05
Total Educational Departments, College Park	\$562,945.43	U.S. Industrial Chemicals	
Total Educational Departments, every		Farm Credit Administration	476.64
T: QL 1 Q '1 Qamias		U.S. Rubber Company—Naugatuck Chemical Division	209.88
Live Stock Sanitary Service:	\$ 1,451.31	Whiteson Products Division, Borden Company	324.00
Grayson Foundation—RH Factor in Horses	41,908.44	John H. Dulaney & Son	790.89
Gray Foundation—Respiratory Diseases in Horses		Oil Meal Processors Association	3,639.05
Total Live Stock Sanitary Service	\$ 43,359.75	Poultry Nonr (151)00	5,115.46
Total Live Stock Samualy Service		Montgomery County Farm Bureau Tax Study	
II CA I I I CLI Pand of Agriculture	Summary of	Publicker Industries	1,815.39
University of Maryland and State Board of Agriculture	L C1-1: - w	Roses Incorporated	1,437.00
Disbursements for Research in the Agricultural Experimen	T Station	American Cyanamid Corporation	1,101.00
For the Fiscal Year Ended June 30, 1953		Carnegie Institute—Project A	2,307.75
State Appropriations		Nonr 556(00)	4,293.14
Research	\$403,686.00	Carnegie Institute—Project B	3,441.64
Seed Inspection	18,209.00	Merck and Company—Poultry Vitamin Research	2,882.28
Cantaloupe Research	1,500.00	American Rose Society	1,514.35
Dairy Inspection	1,700.00	Brewers Yeast Council	2,168.61
Canning Industry	2,500.00	Botany—Miller Chemical Company	2 000 01
Corn Borer Research	7,100.00	Merck and Company	3,000.01 113.39
Miscellaneous	5.95	James B. Glascock Project	1,178.64
Total State Funds	\$434,700.95	U.S.D.A.—A.L.S33455	913.91
	4101,	U.S.P.H.—RG-E225	1.856.43
Federal Appropriations		Dairy—Stein Hall Company	557.91
Hatch Act	\$ 15,000.00	Merck and Company	8,031.05
Adams Act	15,000.00	Roses, Incorporated	1,350.00
Purnell Act	60,000.00	Armour and Company	11,191.63
Bankhead-Jones Act	36,488.62	American Rose Society	1,350.00
Flannagan-Hope Act—State	44,715.51	Publicker Industries	2,432.48
Flannagan-Hope Act—Sociology	1,078.85 19,750.00	Poultry—DuPont Amino Acid	2,204.41
Flannagan-Hope Act—Regional	6,400.76	Horticulture—U.S.D.AALS-33461	3,732.38
Flannagan-Hope Act—Title II		Dairy—National Dairy Research Laboratory	4,989.92
Total Federal Funds	\$198,433.74	Poultry—U.S.D.A.—A.A1-10378	7,028.52

# DO NOT CIRCULATE

		DO TIOX OXYGO	
Botany—National Science Foundation Botany—National Shade Tree Conference U.S.P.H. E225(C)	. 1,158.40 . 1,956.04	U.S.P.H. Analysis of Muscle Proteins (RG-2063C2) U.S.P.H. Urinary Aromatic Acids (G3139) Overhead from Research Grants—Legal Medicine	786.37 604.55 1,238.64
Horticulture—Sutherland Paper Company  Dairy—American Dairy Association	. 802.19	National Fund for Instructional Purposes	15,339.98 1,016.15
Poultry—Forest H. Glickner & Associates		U.S.P.H. Coronary Arteries Study (H-1023)	918.58 989.08
Total Restricted Contracts for Research	\$103,070.89	Pacific Coast Borax Company Fund	3,203.28 1,400.00
Total Agricultural Experiment Station	\$882,675.83	U.S.P.H. Toxin Research Fund (E-276)	6,295.55 7,104.24
UNIVERSITY OF MARYLAND	will tendified	American Cancer Research Fund  Duke Laboratory Fund	5,613.59 8.61
OTHERSTIT OF WINTERTED		Trudeau Fund	290.50
Statement of Disbursements for Research in the School from Gifts and Grants	of Medicine	U.S.P.H. Study of Human Uterine Cervix (CS9163C)	3,729.29
		R and M Regurgitation Fund	3,000.00
For the Fiscal Year Ended June 30, 1953	070.00	Army Infectious Disease Fund (DA49-007-MD237) U.S.P.H. Animal Polysaccharides (E146C)	4,652.62 2,422.32
Leukemia Research Fund Estate of Samuel Jesserum	100.00	Naxy Anoxia Warning Research (N70nr39718)	20,602.06
U.S.P.H. Unexpected Death in Infancy—RG2762R Dr. S. M. Cone—Research in Pathology		(AT(30-1)-1031)	4,704.96
Ohio Chemical Research Fund Isaac E. Emerson Research		Research	3,646.32
Anna Fuller Fund—Cancer Research	3,809.71	Army Chemical Center—Study of Morphological Effects of	00 007 77
Hyson, Wescott and Dunning Fund		Chemical and Mechanical Trauma (DA18-108-CML-3477) Pfizer Scholarship Fund	23,327.55
U.S.P.H. Relation of Metabolism and Function in the Brain		American Cancer Society—X-Ray Studies	1,000.00 $347.65$
Read Foundation Incorporated Scholarship Fund	500.00	Charles Pfizer Fund—Dermatology Research	20.30
Eli Lilly and Company Research Fund		U.S.P.H. Graduate Psychiatric Fellowship Teaching Fund	20.50
American Cancer Society—Follow-up Program	3,541.51	(2M-56315)	7,266.40
Atomic Energy Commission—Irradiation Studies in		U.S.P.H. Cancer Teaching (CT-873CH)	16,138.75
Monkeys (AT (30-1)-1031)		National Foundation for Infantile Paralysis Psychiatric	Name of the last
U.S.P.H. Cancer Research (Figge) (C-845-C3)		Studies U.S.P.H. Blood and Tissue Barbiturate Analysis	5,216.90 2,834.72
Cosmic Radiation Effects Fund—Figge		U.S.P.H. "Schmidt"	2,327.83
Bradley Fund—Pediatrics		U.S.P.H. Analysis of Muscle Proteins (Amberson)	3,247.90
Junior Students' Board and Lodging—City Hospital		U.S.P.H. Pelvic Anatomy Fund (Uhlenhuth)	3,133.28
Damon Runyon Cancer Research		U.S.P.H. Psychiatric Undergraduate Training	12,800.00
Education and Research Fund—Obstetrics		Sigma X-L Research Fund	190.45
Woodward Research Fund		U.S.P.H. Heart Institute (Krantz)	4,353.38
American Cancer Society—Porthyrin Studies		U.S.P.H. Biological Warfare Defense (Woodward)	5,313.62
McCormick Fund—Infectious Disease Research		U.S.P.H. National Heart Institute (Love)	11,013.85
Maryland Racing Commission Fund—Pharmacology		U.S.P.H. Toxin Research Fund (Parker)	3,388.39
School of Medicine Bulletin Fund		Navy Research on Metabolism of Purines	4,760.79
American Cancer Society—Mack Fund		U.S.P.H. Pulmonary Lesions Infections in Infants (Fisher)	3,083.85
Medicolegal Research Fund		U.S.P.H. Melanomas in the Mexican Axolotis (C845C4)	4,509.14
Studies in Medical Logic		Upjohn Dermatology Fund (Robinson, Jr.)	528.00
Navy Psychiatric Training (N7onr-397(06))		T. T. Scott Book Fund	1,000.00
Abbott Transfusion Study Fund		Borated Talc Study (Fisher)	3,260.70
Nutrition Foundation Fellowship Fund		U.S.P.H. Study of Human Uterine Cervix (CS-9163-C2)	1,396.01
Physiology Research Fund		U.S.P.H. Mental Health Fellowship Fund	1,210.01
Research Corporation Fund		Trudeau Society	18.40
Research Problems of Alcohol	4,443.71	Brayton Pharmaceutical Fellowship	1,916.70
U.S.P.H. Biological Warfare Defense U.S.P.H. Cancer Teaching (CT-873C3)		Total School of Medicine	\$329,650.44